

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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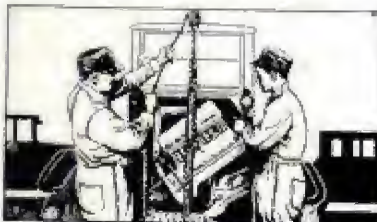


Read, READ—below—what a promi-
nent Studebaker executive says. No won-
der automobile manufacturers and
20,000,000 car owners are tearing their
hair and pleading—"Give us more trained
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Endicott, N. Y.

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Electrical
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by G. F. STUMP
Stump, Ky.



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**The Nestler Rubber Fusing Station is
TODAY'S Best Business Opportunity**

WE would like to tell every man who wants a profitable business in his own name the full facts concerning the amazing Nestler Rubber Fusing Process. Only a bare outline can be given here. In 1839 Goodyear discovered the process of vulcanization. Vulcanization made pneumatic tires possible. Since 1839 vulcanization has been an irreversible process. This is the real reason why the servicing of pneumatic tires has been so unreliable and uncertain in the past and why tire retreading has been a commercial impossibility.

In 1917, Emil Nestler, an officer of this company, discovered a method of de-vulcanizing the rubber on a pneumatic tire without removing it from the tire. Because of this discovery, it then became possible to join new rubber to old so that an actual fusion or welding of the two took place. It welds rubber to rubber like steel is welded to steel with the electric arc.

There are now more than 17 million automobiles in the United States, each of which have four tires. Every year more than half this number of tires—more than 34 million tires—are junked merely because part of the rubber has worn off the treads. A large proportion of these tires could be made to do **DOUBLE DUTY!** A new, tough durable rubber tread could be fused or welded to these worn tires by the Nestler Rubber Fusing Process. They would look and wear like new. Car owners would cut their tire costs squarely in half.

The Nestler Rubber Fusing Process was patented in 1920 and since then, has been in actual use. Hundreds of thousands of tires Nestlerized have demonstrated the soundness of the Nestler Process beyond all argument.

In addition to retreading, the Nestler Process also makes possible tire repairs that literally outlast the tire. Right now Nestler Licensees all over the world are offering Nestler service to their communities, getting the business and making the money.

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ence is unnecessary. Only moderate capital required and there is a big profit in each tire you do. Earnings of \$4,000 to \$15,000 and more annually now being made.

The Nestler Rubber Fusing Process is not complicated—it is simple. It is not costly—it is cheap. It is not slow—it is fast. Nestler Steamless Equipment is not costly—it is moderately priced. Any man of average intelligence can master the Nestler Rubber Fusing Process in a few days' time. Free instruction either in our demonstration schools or by mail is given to all licensees. A new plan makes it possible to *earn while you learn*. Nestler licensees are glad to say that Nestler Cooperation has been one of their biggest assets. At this time a limited number of additional licenses are to be issued. If your community is open, lose no time in finding out how you can secure this valuable franchise.

We have printed two books. One describes the Nestler Opportunity; the other describes the Nestler Process in detail. They give **FACTS!** We will gladly send them without obligation to any man who is interested in the possibilities in a proven, new, uncrowded field, to build a large business with splendid profits. Because of the demand due to present unusually favorable conditions you are urged not to delay. Mail the coupon today.

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Popular Mechanics Magazine

200 E. Ontario Street, Chicago, U. S. A.

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

London: Hachette & Cie.,
15-17 King William Street, Charing Cross, W. C. 2

Paris: Hachette & Cie.,
111 Rue Reaumur

Melbourne: Gordon & Gotch
509-513 Little Collins St.

ISSUED MONTHLY

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In United States and its possessions, also Canada, Cuba, and Mexico, per year, postpaid - \$2.50
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All subscriptions are discontinued at expiration. Please examine the date printed on your wrapper.
Entered as Second Class Matter Sept. 15, 1905, at the Post Office at Chicago, Illinois, under Act of March 3rd, 1879.
Entered as Second Class Matter at the Post Office Department, Canada.

Published monthly by POPULAR MECHANICS CO.

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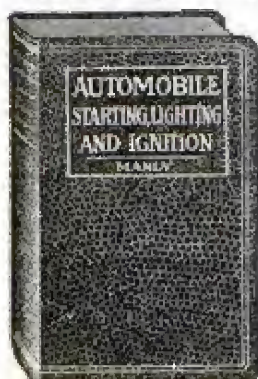
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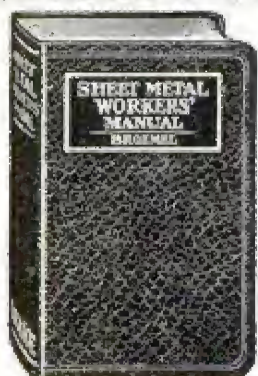
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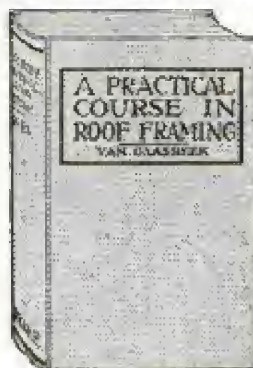
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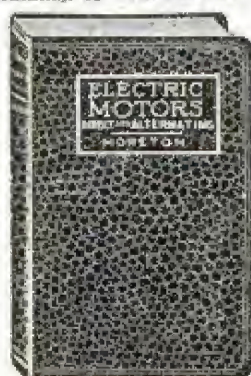
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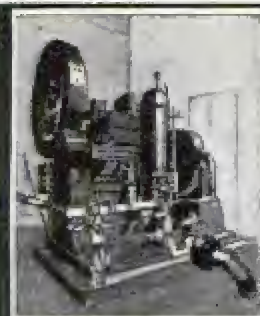
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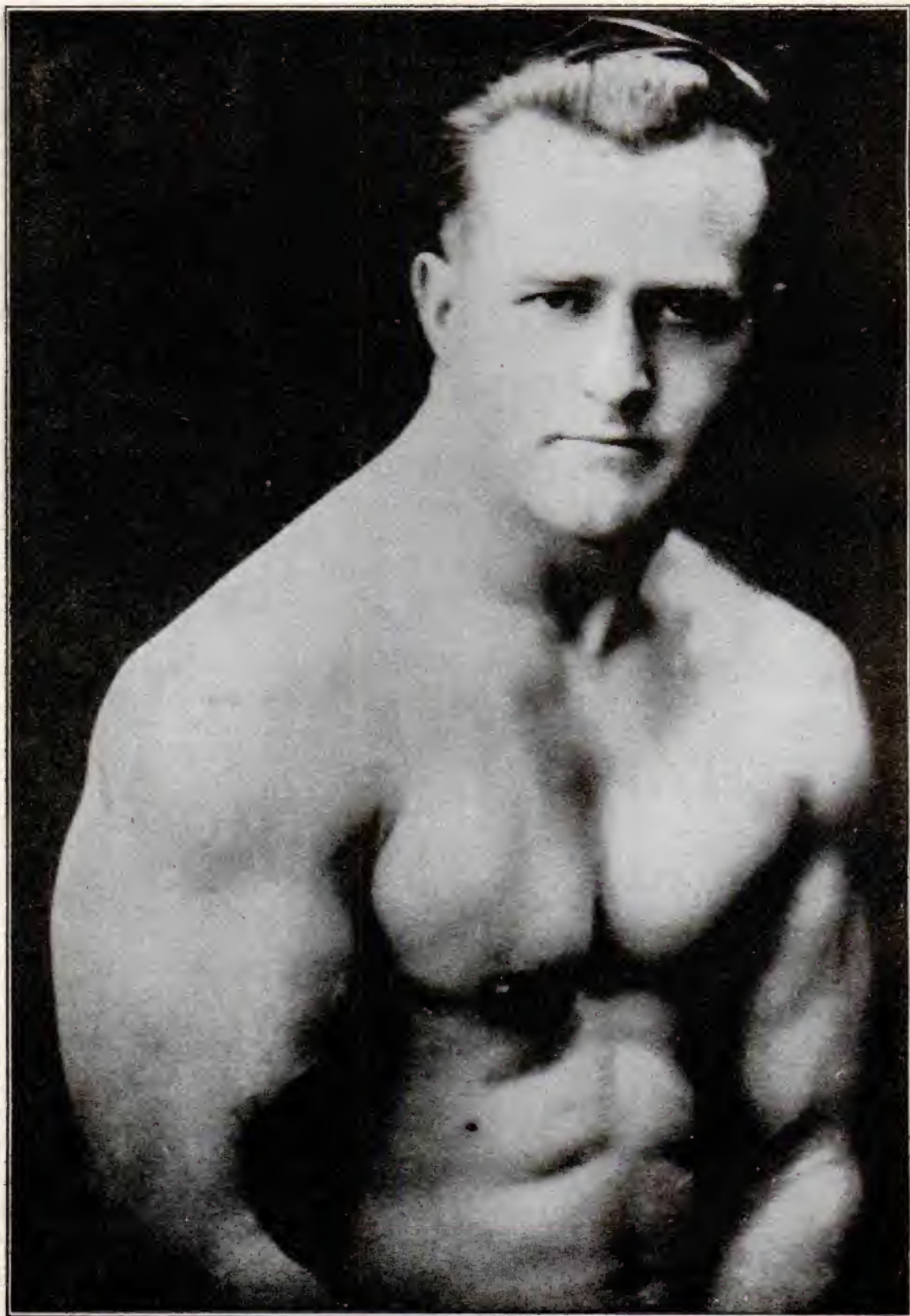
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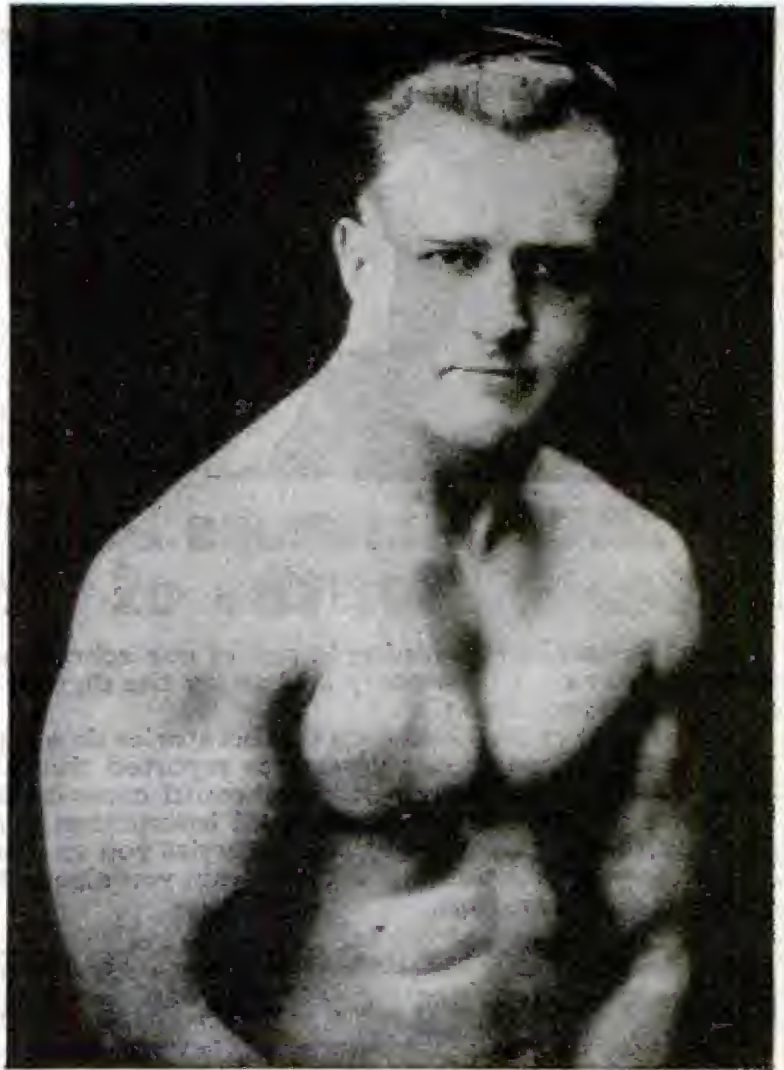
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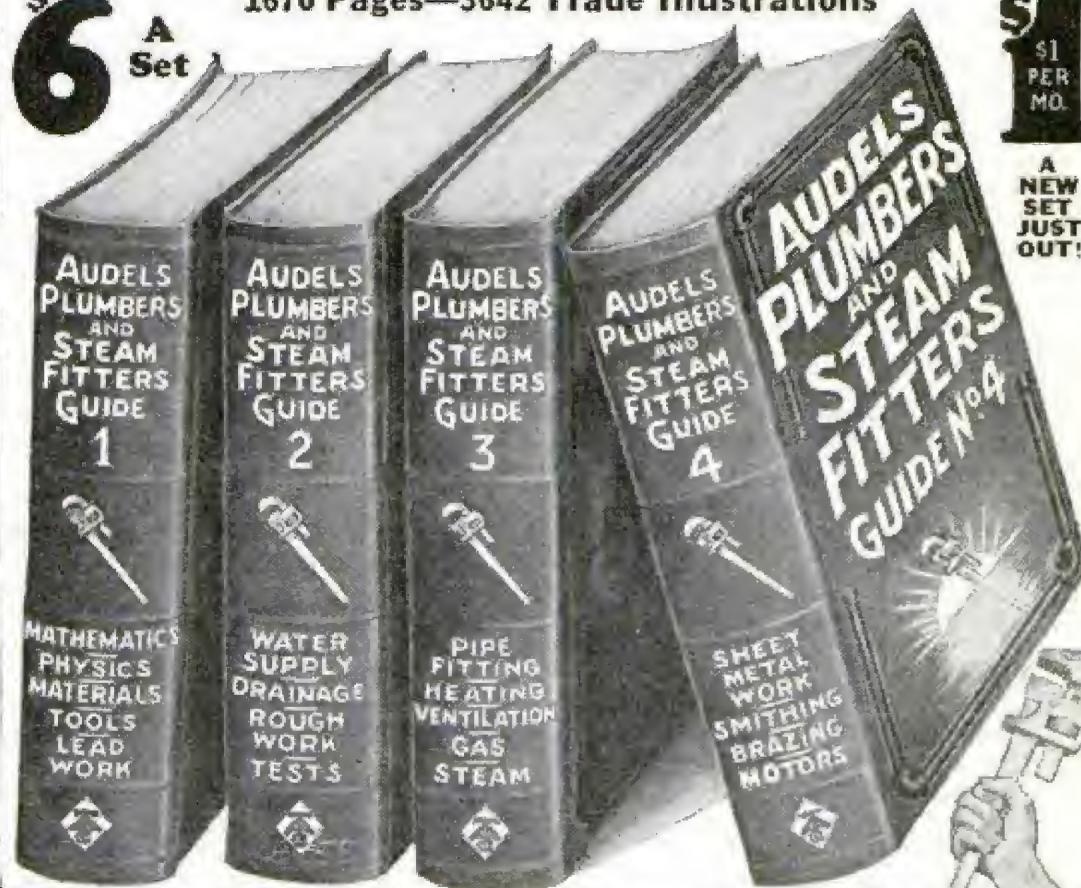
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K. E. Brooks isn't the only one who ripped off his white collar and decided to go after the real money in a he-man's job. Hundreds have done it since the Detroit School of Trades organized its amazing system of training in fifteen different big pay trades. Brooks went straight to D. D. Buick, one of the organizers of the Buick Motor Company and now devoting his life to this work of training ambitious men as Director and Chief Engineer of this Big School. He told Mr. Buick he was sick and tired skimping and slaving on a mere pittance and no hope for the future, even if it did let him sport a white collar, have soft hands and wear snappy store clothes while working!

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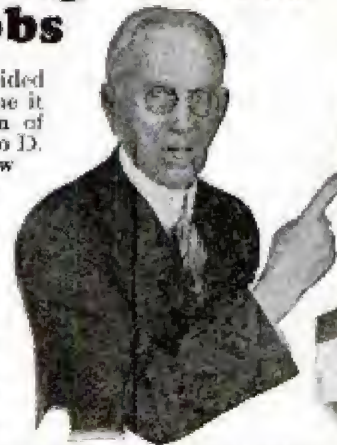
You'll be amazed when you see this mammoth college of building trades, where men from all over the country come to learn the big pay jobs. Here they do the actual work. And they learn fast because Mr. Buick has assembled the finest corps of instructors in the world, and these men teach you by actual work, not books. Here you actually help to build a two story house every two weeks in one of our giant work-class rooms. And you learn all about autos by building real automobiles and trucks. You do everything right on the job. And that isn't all. Here you can earn good money even while going to school, because our students are in great demand in Detroit, city of thousands of great industries.

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When you realize our staggering fire losses, you appreciate what is meant by a timely seller. Over half a billion dollars in property is burned up every year. Over 15,000 lives lost annually. A house is burning down every two minutes! Every half hour fire destroys a human life! These are just a few of the vital "human interest" selling points in the Weldon Plan of Approach that make your job easy and your sales and profits sure.

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Nobody likes to tramp eight hours a day in this selling business. That's too tough a grind and you burn yourself out very shortly. The Weldon Fire Gun is an easy-hour proposition. You need sell only seven or eight Weldons daily to make a big day's pay. If you run according to average Weldon men, you will easily do this. You often sell this many to one customer. That isn't a bad proposition, is it?

Made \$67.50 in One Day

Clement of New Hampshire proved that the Weldon Fire Gun is both a quantity order proposition and an easy-hour job by making \$67.50 in one day. La Barr of Minnesota made \$167 in a week. Butters of Florida made \$592 in a month. Every inch of space on this page could be filled with the names of more big money makers on the Weldon pay roll. Many of them were ready to quit selling before they came to Weldon. Now with the help of Weldon they have made themselves into high-pressure salesmen. They are cleaning up big money—many of them did it even while learning. Even experienced salesmen accustomed to making big profits were amazed at how much more money they could make with Weldon and with far less effort.

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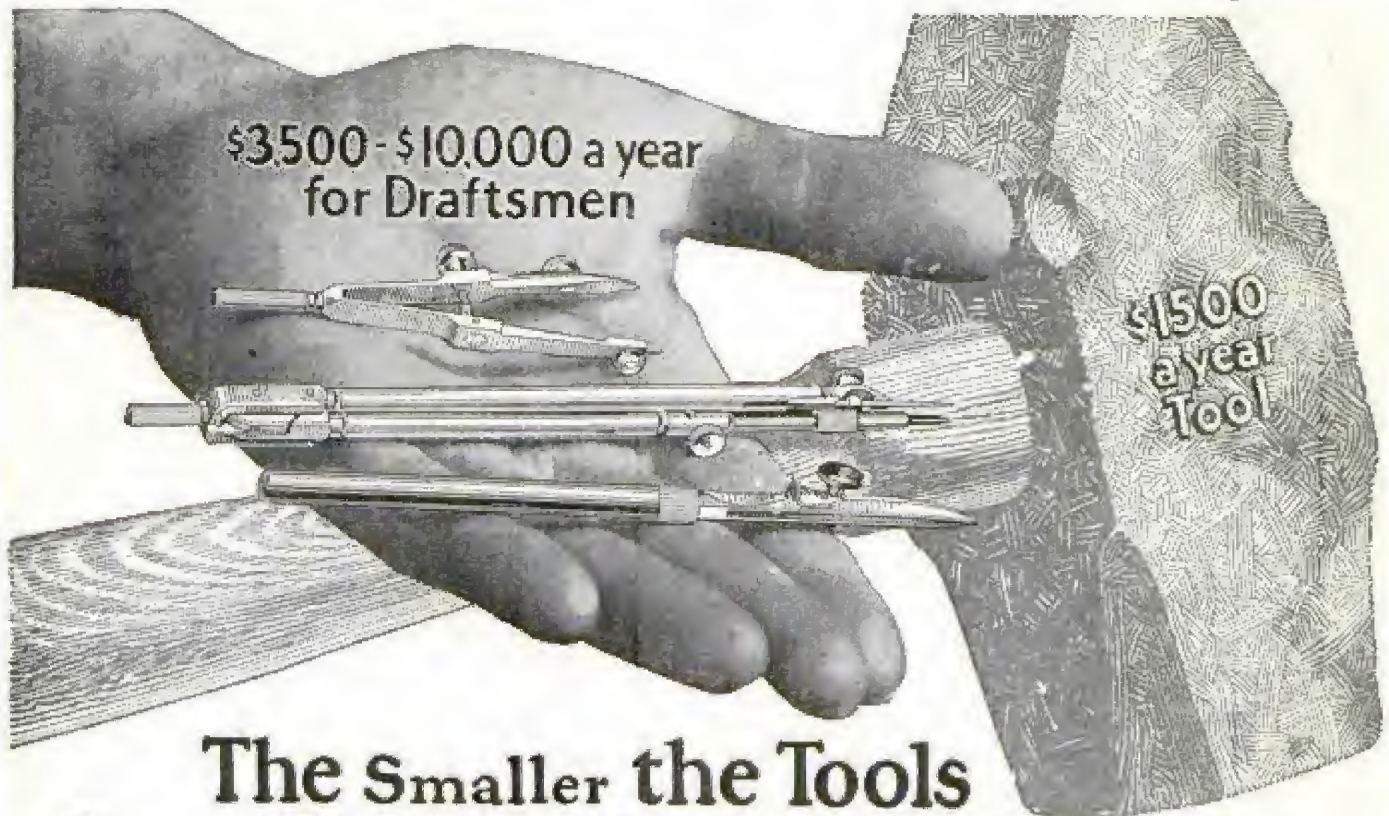
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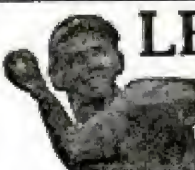
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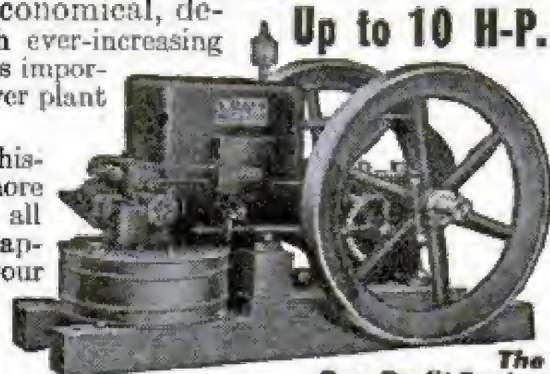
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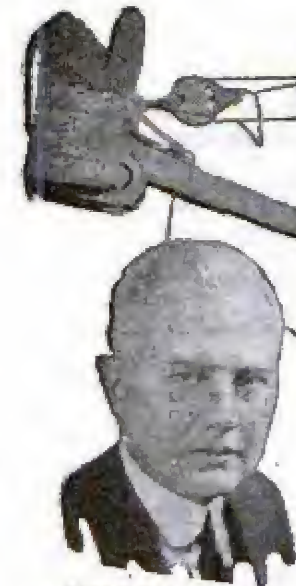
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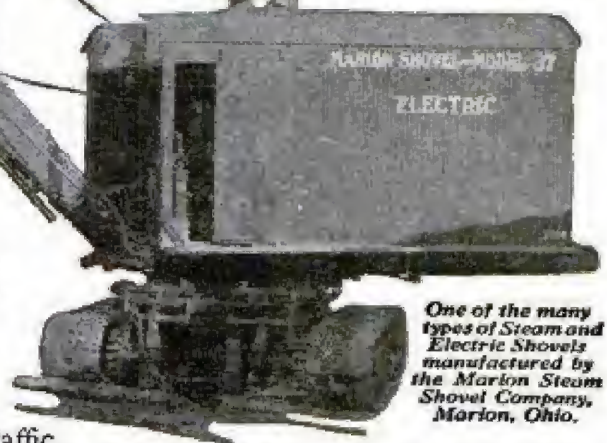
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But with this startling little device in a car all this is changed. As soon as the engine warms up, this device automatically begins to admit a much larger volume of air, thoroughly vaporizing all the gasoline, giving it fully 50% more power—breaking it up so that it explodes instead of burning.

A Carbon Remover

Not only does this invention save half the gasoline, but it also saves the expense and time of having carbon scraped out—a job costing from \$5 to \$25. It prevents carbon formation and it removes carbon after it is formed.

Save Half Your Gasoline

The Stransky Vaporizer actually cuts the cost of gasoline in half, by making each gallon give double the power, double the mileage. Unless you use the Stransky Vaporizer, you are actually losing half your gasoline—for every ten gallons you buy you are losing five. Already it is being used by over a million satisfied car owners—on all makes and models of car.

To introduce this new invention, Mr. Stransky, the inventor, will send a sample at his own risk. Not only that but he will actually pay you for testing his Vaporizer if you are not delighted with it!

The demand for the Stransky Vaporizer is enormous. Agents handling this device are simply coining money. Every auto owner in the country—and there are twenty million of them—wants this splendid new invention the minute he sees it. Just send the coupon at once for full details of our introductory sample offer. Be the man to cash in big in your community.

J. A. Stransky Manufacturing Co.

R-10 Stransky Bldg., Pukwana, So. Dak.

**Cut
Your Gasoline
Cost to 9¢
a Gallon**

Dodge Goes 40 Miles on a Gallon
I must say the vaporizer I used on my Dodge is all you say it is. I made over 40 miles per gallon between Brownsville and Tampico, Mexico.—T. L. Brown, Texas.

Ford Runs 60 Miles on a Gallon
I made approximately 60 miles per gallon of gas in a Ford Sedan as I made 15 miles on one quart of gas.—O. G. Zeigler, Pa.

Best Sellers I Ever Saw
One day I sold 111 and another 203. They are the best sellers I ever saw.—S. W. Brawley.

\$39 in Three Hours

In three hours on Saturday I cleared \$39. In one hour on the previous Saturday I cleared \$18.—T. M. Wiley, N. C.

32 Miles With Buick

Vaporizers installed on both Buick and Ford and are doing wonderful work; getting 32 miles on Buick and 51 miles with Ford.—Harvey C. Hipple.

Chevrolet Makes 43 Miles on a Gallon

We have tried them out. Ford got 40 miles out of a gallon of gas and Chevrolet got 43 miles.—F. X. Carroll, Ind.

Sold 32 to Yellow Taxi Co.

Yesterday I sold the Yellow Taxi Co. 32 vaporizers after they had tried one out for a week.—F. J. Manker, R. I.

Mail This Coupon Today

J. A. STRANSKY MFG. CO.,

R-10 Stransky Bldg., Pukwana, South Dakota.

Tell me how I can get samples of the Stransky Vaporizer at your risk.

Name.....

Street or R. F. D.....

City.....State.....

BOYS



Drawn from actual photograph of student doing spare time electrical work

Learn Electricity Make Big Money

How would you like to earn two or three dollars every evening after school and prepare yourself for a fine big job at the same time? Here's the opportunity of a lifetime for you fellows wholike Electricity. Begin right now to prepare yourself for a regular man's size job in this fascinating field. Your chances for a big success are simply wonderful—the pay is big (thousands of men earn \$70 to \$200 a week) and advancement comes swift and sure.

I Will Train You at Home

With my easily earned, spare time Electrical Course I will train you at home like I have trained hundreds of other boys who are now big successful men. It will not interfere with your school work and you can earn more than the small cost of the course doing odd electrical jobs in your spare time. The Course pays for itself. I will show you how to get this work and how to do it. Some of my boy students make \$10 to \$15 a week this way.

Tools, Apparatus and Radio Course —Given Without Extra Charge

Send me the coupon below and I will tell you all about the big outfit of tools, apparatus and instruments and a new Radio Course that I am giving to my students for a limited time. I will send you my big interesting Electrical Book and a sample lesson, too—all Free. You will be tickled with the things I will send you Free. Mail the coupon right now.

L. L. COOKE, Chief Engineer
Chicago Engineering Works
Dept. OIA CHICAGO

Look What This Boy Is Doing

"Although the School term is coming to a close, and I am pretty busy with my examinations, I manage to keep up with my electrical studies and work."

"I guess I forgot to tell you I am now in business for myself. Am doing fine, but owe it all to you. If it had not been for your Course, I, being under age, could not have secured my license in this town. But I got it, and now have all the work I can do, averaging \$20 to \$30 a week, thru spare time work."

"I went out on a job tonight after school, on which I made \$3 and brought home another on which I made \$2.50—\$5.50, for 4 hours' work and no material furnished by me."

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1215 Chestnut St.
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Send me your Big Outfit Offer, your big Electrical Book, Sample Lesson and particulars of your Electrical Course and Extra Radio Course. This will not obligate me in any way.

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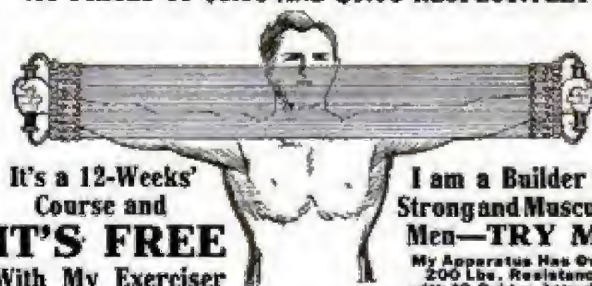
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I give you, free, the most complete course you ever laid your eyes on. And, Oh Boy! Isn't the expander set a great exerciser? And just think of the price—it's hardly a price at all. A few dollars are all that are needed to bring you this great 5 or 10-cable pro-

gressive exerciser and my Free personal 12 weeks' course.

A few minutes a day for 3 months is all that is required. \$3.00 or \$5.00 is all it costs you or ever will cost you if you get the right system at the start.

It can be made so that a child can use it, and powerful enough for the strongest man. Try it and you'll proclaim it the best muscle building exerciser you can buy—without exceptions.

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Please find enclosed { \$3.00 for your 5-cable Exerciser and 12-weeks' course.
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City..... State.....

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Yes, learn to become an expert wrestler right in your own home, by mail, from the greatest wrestlers the world has ever known. Be an athlete, be strong, be healthy. Learn how to throw and handle big men with ease. Learn to defend yourself. All taught in our course of lessons, and illustrated with hundreds of charts and actual photographs by

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A post mortem of Caruso's throat showed superb development of his Hyo-Glossus muscle—again proving the soundness of Eugene Feuchtinger's theories of voice production.

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Professor Feuchtinger, A. M.—famous in the music centers of Europe—discovered the secret of the Hyo-Glossus muscle. He devoted years of his life to scientific research and finally perfected a system of voice training that will develop your Hyo-Glossus muscle by simple, silent exercises right in your own home.

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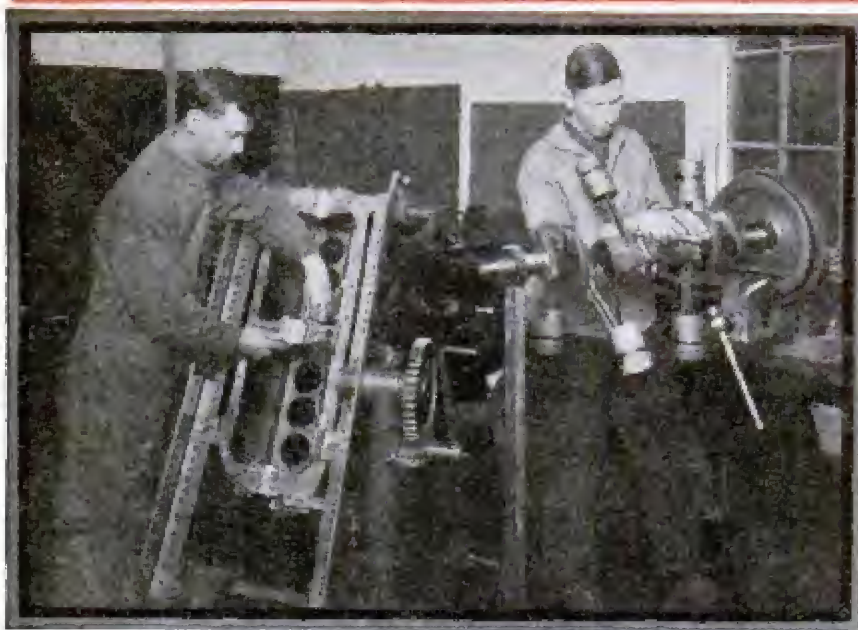
☐ Singing ☐ Speaking ☐ Stammering ☐ Weak Voice

Name

Address

Age

Learn Autos In Detroit



An example of the kind of practical shop training you get at the "Michigan State" in Detroit, the Auto Center. The knowledge we put in your head guides the skill we put in your hands. Howard (New York) says: "The foundation you gave me enabled me to jump ahead of men who had 12 to 15 years' experience."

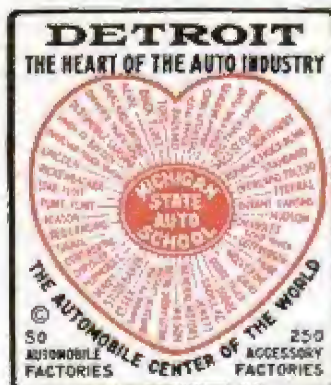
100,000 Trained Auto Men Needed Yearly

Where can you find such an opportunity as this? The Auto Business has grown in a short period to be the biggest business in the world. Its volume is above that of the steel or railroad industries. And it has more individual opportunities than any other business. A hundred thousand more trained men are needed every year, but they are not produced. So the field is getting bigger all the time. Green men can't draw the good pay. But trained men can. McMannis (Quebec) writes: "M. S. A. S. training doubled my salary. I specialize in auto-electricity and welding."

Come to Detroit the Auto Center

Of course Detroit is the place to learn autos. Over three-

fourths of all cars come from here. Detroit training is practical training. Stick this in your memory,—the Detroit Trained man has an immense advantage over all others. So come here as soon as you can. Come now if possible. If you can't come now, start to learn under our Home Study Plan. (This does not cost anything extra.) Then plan to come here to School later to finish in thorough "Detroit training." Hill (Mich.) writes: "I doubled the money many times that I spent at your great School."



You'll Enjoy a Summer in Detroit

Detroit is the fourth city of the U. S., a great city for business. It is also a celebrated "summer resort" city. Here business is always good and weather is always fine. That's a sure winning combination. Detroit's location in the center of the Great Lakes district gives it ideal climate, not too cold in winter, not too hot in summer. Situated on beautiful Lake Erie and the Detroit River.

Get away from the burning sun into the cool breezes of Michigan. After school hours, enjoy boat trips, swimming, fishing, sailing, canoeing on the lakes and river. Public bathing beaches near us, beautiful parks, excursion trips.

See major league baseball games—see Ty Cobb, "Bucky" Harris, Babe Ruth, Walter Johnson, Eddie Collins, Speaker, Slater—all the stars. Spend a pleasant summer and improve yourself at the same time. We work hard here but we believe in some good times, too.

By Practical Factory Approved Shop Methods

You can start right now to get ahead in the world! The great success-training of this world-famous "Michigan State Automobile School" can be brought to you at home if you are not ready to come to Detroit now. Read all about it in this announcement. And send the coupon on the opposite page for full detailed outlines of the Courses.

Thomas (Pa.) became foreman of Dodge garage at \$200 a month, three months after graduating.

Factories Endorse These Courses

Auto factories endorse "Michigan State" training methods. Because they are thorough, practical. Because they put knowledge in your head and skill in your hands. Because they really fit you to make good. Greve (Calif.) paid for a home his first year in business for himself.

Help to Get Jobs

"Michigan State" trained men are wanted, in Detroit, in your home town, in garages throughout the country. We place many of our graduates directly. This Employment Service is absolutely free. Kelly (Ohio) writes: "I get \$1.00 per hour now for truck repair work."

No Exaggeration

Note that we don't promise to put you on top of the world in a few weeks. We know the great need for skilled men, and the wonderful future ahead of you if you get started now. But we know it takes work. It takes real knowledge. And that we can give you. Then start in a good job and advance to big money. Auto knowledge means steady work, wherever you want to go, at good pay, and a certain future.



A class of 600 students in front of the M. S. A. S. Main Building

MICHIGAN STATE

306 Auto Bldg.

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100,000 Trained Auto Men Wanted This Year

Or At Home!

You can earn more money. Skilled auto men are wanted everywhere at good pay. Service managers tell us that **100,000 more trained auto men are needed every year.** They don't get a tenth of that number now. Here is your supreme chance to get out of the rut of poor pay 20 million cars now, and three million or more new ones every year. Think of it! Get your start now. No experience or education is required. We will teach you.

Ackerly (Va.) did \$21,000 business his first year, in a town of 500 population.

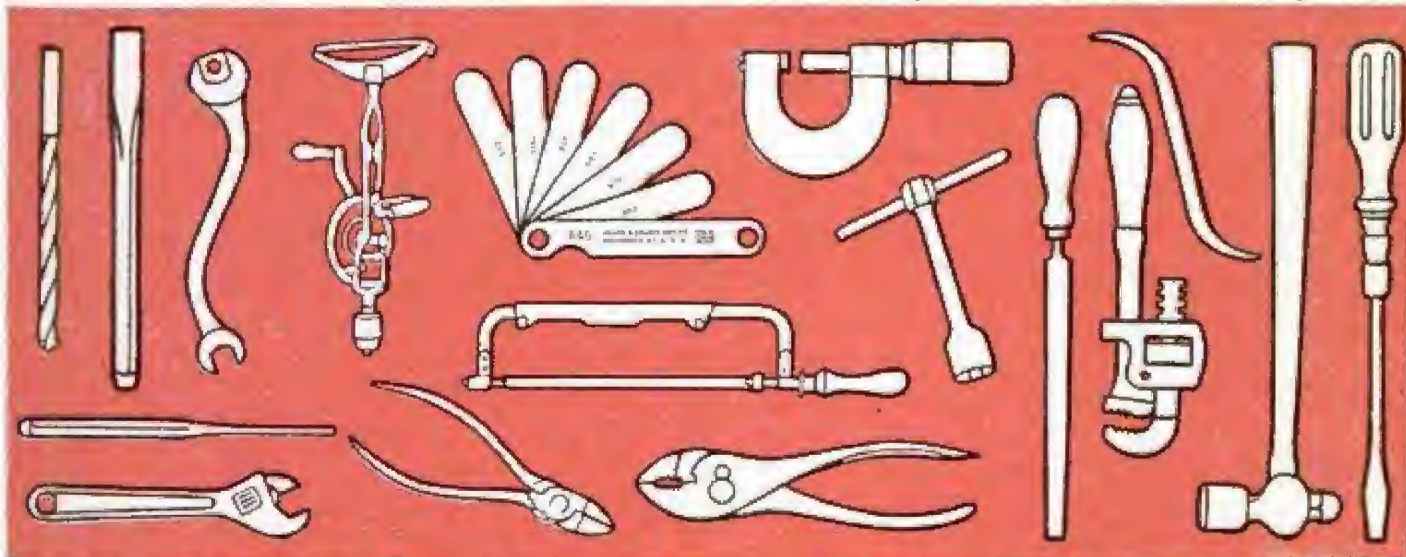


Work With Real Tools and Learn to Use Them Right

You must have expert training to get these good pay jobs. We train you with tools. You learn how to use them right. You learn from real practice, how cars are made and how to repair them. You have head training too as well as hand training. The man whose hands only are trained, fails when he hits the

hard jobs. There are no hard jobs for Michigan State trained men, for they have the **knowledge in their heads** to guide the skill in their hands.

Hatfield (Ohio) writes: "The week before Christmas I cleared \$80.75 profit in my garage, but it was a **poor week.**"



FREE Management Course

Through our close cooperation with the auto factories in Detroit, we secure one of the leading service managers to train our students in the **business end** of running a garage. This training is worth \$100 alone. But it costs you nothing extra. It is just another one of the **big advantages** of Michigan State training. All students get this free Business Course. Jamison (Pa.) writes: "I have six men in my shop and work day and night. Five other garages in town are not busy. Training does it."

A Business for Go-Getters

The auto business is intensely interesting. There is something new in it all the time. New cars, new types of electrical systems, engines, etc. The skilled man understands these new things at once. He helps car owners when in trouble and quickly gets their confidence. He **earns big money** by doing this. Put yourself in such a place. As a green man you can never do it. But training will put you there quickly. J. T. Ghiardi (Mich.) says: "I went to two schools before going to yours, but they do not compare with old M. S. A. S."

Cone (Detroit) earns \$3000 a year as service man for Studebaker.

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You can't become an electrical expert in 60 days! Nor by reading books alone! You must have practical training with complete equipment, under the personal guidance of competent instructors.

I have trained 16,000 men, and I know there is no short cut to success in the electrical industry. On the other hand, I know that any man who is honest with himself and who gets thorough training can forge ahead faster to a BIG PAY job in electricity than in any other line I know of.

Quality Training at National!

I give you your money's worth at National. \$500,000 worth of equipment. The best instructors I can hire. Personal help all the rest of your life. No free railroad fare, no vain promises—just honest training. I give you the start to go out in the electrical world and hold down a man's job as an Electrical Draftsman, Construction Expert, Telephone Engineer, Commercial Radio Operator, Storage Battery Expert, Illuminating Engineer, or Power House Expert at \$60 to \$200 a week.

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My big FREE Electrical Catalog gives you all the facts about National training—tells of the wonderful opportunities in the important centers of the hydro-electric industry—shows you how to avoid pitfalls and disappointments and come out on top. Mail the coupon at once. Get the WHOLE TRUTH about Electrical Training.

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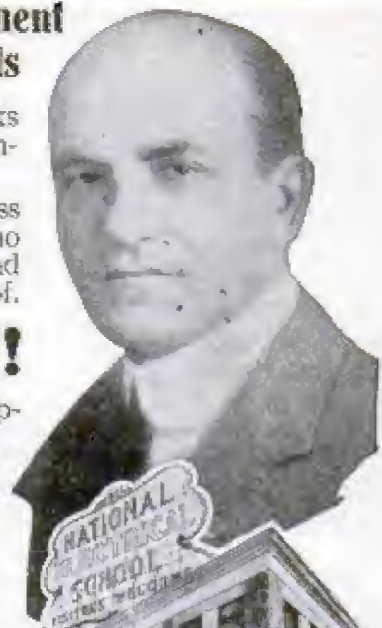
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Steady Work—No Layoffs—Paid Vacations—Travel, See
Your Country—Common Education Sufficient
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Tobacco Is Hurting You

Look at the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For you know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but sure.

Tobacco is lowering your efficiency. It slows a man down. Makes it harder for you to concentrate your mind on your work. You haven't near the amount of "pep" and energy you would have if you stopped using it. There's many a man twice as old as you in years who's twice as young in energy, simply because he lets tobacco alone.

Some day you will realize to what an alarming extent tobacco has undermined your system.

When your hands begin to tremble—
and your appetite begins to fail—
and your heart seems to "skip a beat" now and then—
and slight exertion makes you short of breath—
then you have a right to suspect that
TOBACCO is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And YOU know that the use of tobacco in any form is an expensive, utterly useless habit. You know you ought to quit.

Tobacco Habit Banished Let Us Help You

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it—whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a very few days. Not the slightest shock to the nervous system. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

It is in no sense a substitute for tobacco. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves and make you feel better in every way.

Results Guaranteed

A single trial will convince you. Our legal-binding, money-back guarantee goes with each full treatment. We will refund every cent you pay for the treatment if after taking it according to the easy-to-follow directions, it should fail to banish the tobacco habit completely.

SEND Coupon for Free Proof

Let us send you our free booklet on the deadly effects of tobacco, together with testimonial letters from men all over the country telling how they have been absolutely freed from the tobacco habit by this simple home treatment. You could not ask for stronger proof that Tobacco Redeemer will free you from the habit than the evidence we will gladly send on request. Just mail the coupon—or a postal will do.

NEWELL PHARMACAL CO.

Dept. 300 Clayton Station St. Louis, Mo.



Free Book Coupon

NEWELL PHARMACAL CO.

Dept. 300 Clayton Station St. Louis, Mo.

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that Tobacco Redeemer will positively free me from the tobacco habit or my money will be refunded.

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Street and No.

Town..... State.....



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FOLLOW him through all the excitement of his chase of the counterfeit gang. See how a crafty operator works. Telltale finger prints on the lamp stand in the murdered girl's room! The detective's cigarette case is handled by the unsuspecting gangster, and a great mystery is solved. Better than fiction. It's true, every word of it. No obligation. Just send the coupon and get—

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Can you meet this test?

Can you read and write? Are you ambitious? Would you give 30 minutes a day of your spare time preparing yourself for this profession? Would you like a life of excitement, thrilling adventures and high pay? Answer "yes" and I'll show you how to attain all this.

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Age

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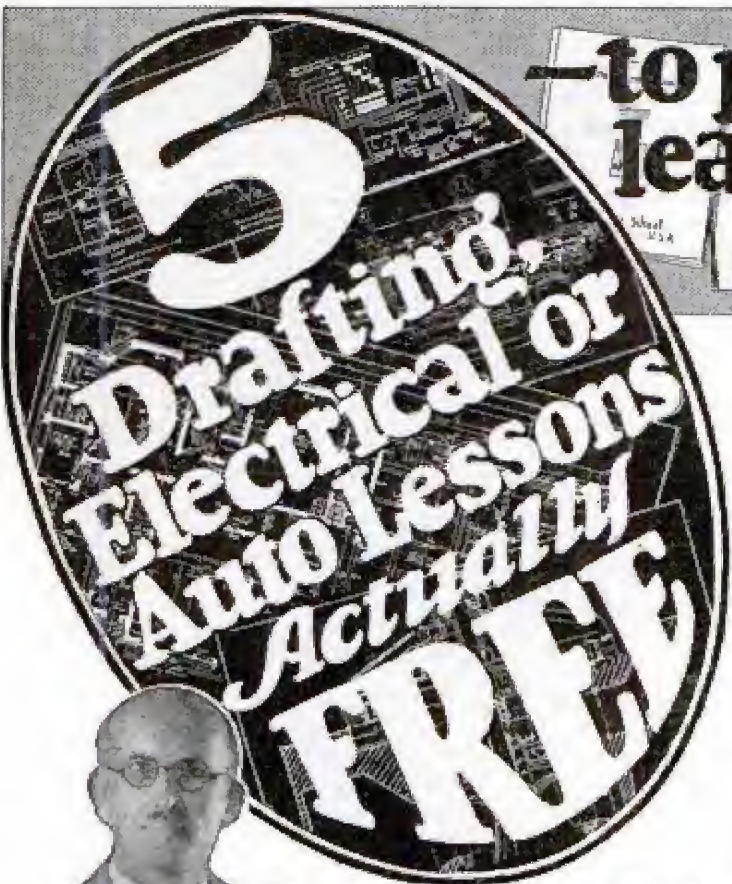
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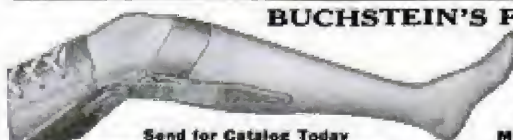
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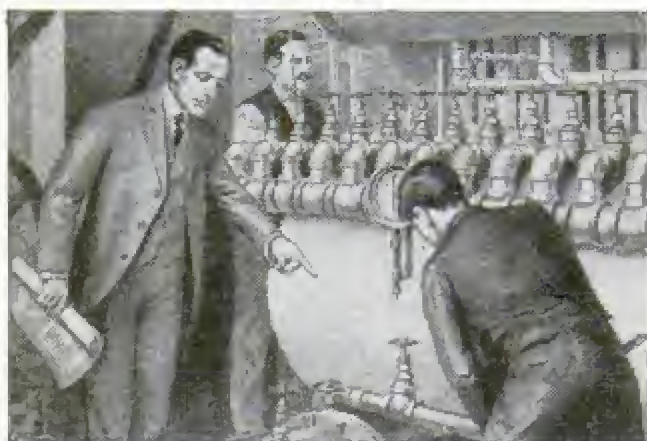
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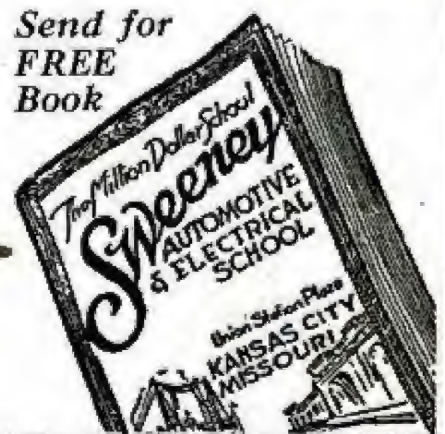
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WANTED, Dealers and State Distributors. Exclusive territory. Noiseless Radio Battery Eliminator. Tremendous sales. Enormous repeats. Large profits. Write. Harcourt Electric, 2029 Indiana Ave., Chicago.

BUILD splendid business making chipped glass number and name plates, signs, check-boards. Write for particulars. Simcox Utility Co., 1133 Broadway, New York.

AGENTS \$85.00—\$125.00 weekly. One man made \$65.00 one day selling famous Studebaker 21 Jewel Watches direct from factory. Easy Payments. Latest thin models. Outfit free. Full or part time. Write today. Studebaker Watch Co., Dept. B-373, South Bend, Ind.

FORD Salesmen: A shock absorber, a recent development and a fast seller, fully guaranteed, \$6.50 complete. Agents wanted everywhere. Can you sell? Write the Eclips Co., 1711 Hertel Ave., Buffalo, N. Y.

WANT distributing agent for Handiek, powdered handsoap; removes anything from the hands without injury to skin; everybody a customer; great opportunity for hustler to get in business; sample free. Solar Products Co., A2144 So. Troy, Chicago.

\$50.00 WEEKLY. Pleasant work, applying Gold Initials on Automobiles. \$1.45 profit every \$1.50 job. Experience unnecessary. Free Samples. "Rakeo Monograms," 1043 Washington, Boston, Mass.

AGENTS: Millions of motorists eager buyers. New patented "Anti-glare," fits over eyes, prevents accidents, wrecks, saves lives, 100 to 200% profit. \$20 daily easy. Write quick. Fairmont Opt. Mfg. Company, 305 South Street, Waltham, Mass.

EARN \$30 to \$100 a week taking orders for Furniture and House Furnishings from Catalog on Easy Payments. No experience or capital required. Full or part time. Outfit Free. L. Fish Furniture Co., Dept. A90, 2225 West Pershing Road, Chicago, Ill.

WE pay \$48 a week, furnish auto and expenses to introduce our Soap and Washing Powder. Buss-Beach Company, Dept. A42, Chippewa Falls, Wis.

EASY money applying gold initials, monograms on automobiles. Anyone can do it. Simply transfer from paper. Charge \$1.50, cost \$.05. Samples and information free. World Monogram, Dept. 35, Newark, N. J.

AGENTS sell Mystic Fly Spray to Housewives, Hotels, Restaurants. 100% Profit. Exclusive territory, sales guaranteed. Write today. United Laboratory, Box 73, Batavia, Ill.

AGENTS Wanted—Something new—Fyr-Fyter sells easily. Makes a spectacular demonstration; car owners, homes, factories, stores, practically buy on sight. Our men make \$10 to \$50 a day. Exclusive territory to producers. If you wish to establish a business of your own with unlimited possibilities for making big money, write us today. Fyr-Fyter Co., 1134 Fyr-Fyter Bldg., Dayton, Ohio.

NEW Wonderful Seller. Cost 10c, profit \$1.40. Monogramming Autos. Lifetime opportunities. Free samples. Monogram Co., R125, Worcester, Mass.

AGENTS, I'll pay you \$240 month taking orders for New Guaranteed Hosiery. Biggest, best, most beautiful line offered. Pay you daily in advance. Extra bonus besides. New plan puts you above competition. No experience needed. Credit given. Samples furnished. Write for amazing offer. Jennings Hosiery Co., Dept. 1031, Dayton, Ohio.

We have two of the fastest sellers on the market. Big repeats, big profits. No canvassing. Standard Specialty Co., 601 Maple, Rockford, Ill.

SELLING Like Blazes! Eleven piece toilet goods assortment at \$2.00 with two piece carrying set Free to your customers. 100% profit. Davis Products Co., Dept. 56, 1321 Carroll, Chicago.

AGENTS—\$500 monthly easy selling Magic Gas. New Discovery. \$1 box equals 33 gallons gasoline. Proven merits. Your name on cans. 300% profit. Write quick. P. A. LeFebvre & Co., Dept. 24, Alexandria, Ontario, Canada.

BIG money daily selling guaranteed Union Made to measure men's suits \$12.50. Lined suits, flap pockets \$13.50. Latest patterns—also raincoats, topcoats, caps, riding breeches, boys' suits. Attractive outfit free. Double Service, 1327 DN Washington, Chicago.

TIRED of Working for other people? Without experience, training or capital I'll show you how you can become financially independent. Easy, pleasant work. \$100 profit every week. Free automobile. Write today for particulars. Albert Mills, Mer., 6094 American Bldg., Cincinnati, Ohio.

AGENTS, \$260 month. Bonus besides. Introduce finest line guaranteed hosiery you ever saw. 124 styles, colors. New sales plan a wonder. No experience needed. No license to pay. Auto furnished. Credit given. Spare time satisfactory. Samples furnished. Wilkint Hosiery Co., Dept. 431, Greenfield, Ohio.

MIRRORS Re-Silvered at Home Costs Less 5 cents per square foot; you charge 75 cents. Immense profits, playing like new; brassy, worn-off autoparis, reflectors, tableware, stoves, etc. Outfits furnished. Details Free. Sprinkie, Plaster, 128, Marion, Ind.

SALESMEN: Write your name and address on a postal and mail to us. We'll show you sure earnings of \$20.00 a day. Will you risk one minute, and a one cent stamp against \$20.00? Mind you, we say we'll show you. Address Dept. 875, William C. Bartlett, Inc., 850 W. Adams St., Chicago.

AUTO owner tire agent wanted each locality to use and take orders for handmade Melinger fabric and cord tires; guarantee bond 8,000 and 12,000 miles (no seconds); shipped prepaid on approval; get your tires free; no capital or experience required; make \$100 to \$300 weekly. Write for wholesale prices and sample kit. Address. Melinger Tire Co., Dept. 400, Kansas City, Mo., Dept. 400, Philadelphia, Pa., or Dept. 400, Oakland, Calif.

CALIFORNIA Rosebuds selling like hot cakes. Agents colning money; new stuff. Big profits. Catalog free. Mission Factory PM, 2348 West Pico, Los Angeles, Calif.

AGENTS—Write for Free Samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn \$100 weekly and bonus. Madison Company, 566 Broadway, New York.

REMNANT Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

NOW Ready—1926 Edition Sheridan's Directory. Completely revised. Contains supply source for thousands of articles at Wholesale. Where to buy everything at rock-bottom prices. Postpaid, \$1.00. Harriman Trading Company, Dept. P.L., 162 East 23rd St., New York City.

EVERY Autoist will buy Auto Mitten Dusters. Send for Particulars and Free Sample. National Fibre Broom Co., St. Louis.

YOU—can't answer all the advertisements so why not answer this one? We offer 100% profit, experience unnecessary. Goodreau Products, 270 Brook, Providence, R. I.

NEW Camera takes and finishes photos one minute. Make money taking photos, selling cameras or doing both. Exclusive territory. Crown, Dept. 302, Norwalk, Conn.

WE Pay \$50 a Week and Expenses and give auto to men and women introducing our goods. Marx Co., D30, 4520 Magnolia, Chicago.

AGENTS—Best seller; Jem Rubber Repair for tires and tubes; superseded vulcanization at a saving of over 800 per cent; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 501.

ONE Agent Sold 100 Quick Action Morey Rim Tools in 3 days. Profit \$1.25 tool. Another 13 of 13 demonstrated. For five agents. M. Morey Rim Tool Co., Blissfield, Mich.

MARVELOUS! Amazing! Spick-And-Span liquid window shade cleaner. Nothing like it. Cleans soiled shades like new. Lightning seller to homes, hotels. Enormous profit. Sure repeater. Free starting offer. Cannon Laboratories, 365, 6309 Yale Avenue, Chicago.

SOMETHING new—Presto Rubber Repair for tires, tubes; all rubber goods put on cold, no heat, acid or tools; vulcanizes itself in few minutes. Sells to auto owners and dealers, sample free, Pioneer Products Co., Dept. A, Roehling, N. J.

AGENTS. Sell rich looking 36x68 imported rugs, 90c each; Carter, Tenn., sold 115 in 4 days, profit \$57; you can do same. Write for sample offer selling plan. Sample rug by parcel post \$1.10. E. Condon, 120 High St., Boston, Mass.

FORDS—Fords! No Boiling! Cools. Fuels, Decarbonizes! Beats any gas saver out. Cheap, practical, thoroughly tested. County distributors wanted now. Salesmen mechanics, Ford owners make \$100.00 per week this summer. Atlock Products, Long Beach, Calif.

PHOTO Medallions. Earn \$100 and more every week. Take orders for Famous P. & G. Photo Specialties—the quickest sellers and biggest profitmakers in the field. Includes Clock Medallions, Powder Compacts, Mirrors, Photo Jewelry, Frames, etc. Every home a prospect. Don't wait—write Now! Puddin' & Goldstein, Dept. "A," 259 Bowery, New York.

A BUSINESS of Your Own—Making Sparkling Glass Name and Number Plates, Checkboards, Signs, Big Book and Sample Free. E. Palmer, 512 Wooster, Ohio.

66 MILES on 1 Gallon—Amazing new Gas Saver. All autos. 1 free. Critchlow, O-132, Wheaton, Ill.

ORANGEADE, in powder—just add cold water—most delicious drink you ever tasted. Fine for home, parties, picnics, dances, etc. Start in this business—big money easily made. Send dime for ten glass package, postpaid. 7 kinds, Cherry, Grape, Lemon, Strawberry, etc., for 70 glasses only 50c, postpaid. Morrissey Company, 4417-25 Madison St., Chicago.

MAKE very latest Guaranteed Products—300 to 1,200% profit using Miller's Tested Manufacturer's Formulas—Stamp brings valuable, interesting literature, explaining how others sell your goods—No machinery—Investment small—all lines. Information Guaranteed Reliable. Miller, Chemist 1706-S Jetton, Tampa, Fla.

SELL guaranteed shirts, overalls and work pants. Big variety of shirts, including silks, with a splendid line of union made work and flannel shirts, overalls, coveralls, work pants, play suits, all guaranteed. Sell direct to wearer full or spare time. No experience required. Write today for Free Selling Outfit. Nimrod Shirt Co., Dept. 8, 4922-24-26-28 Lincoln Ave., Chicago.

\$20 DAILY Selling Ver-I-Ezy Men's Shoes direct. Sell relatives, friends, neighbors first. Low priced. Give real comfort, long service. You take orders, keep big commission. We ship and collect. Full or part time. Write Now. Easy-wear Shoe Company, Dept. 229, Indianapolis, Ind.

DIRECT factory representatives for changeable-letter window-display signs. Good income assured. Experience unnecessary. Samples free. Muze Manufacturing Co., Dept. PA, Norwood Station, Chicago.

AGENT makes \$57 a day driving nails in tire! Amazing discovery heals all punctures—one tire was punctured \$77 times without a leak. Send for free Sample Offer. O. S. Nelson, A-3025 Logan Bldg., Mitchell, S. Dak.

AGENTS—Wonderful seller, new discovery. Auto Rubber Repair for tires and tubes. Superior to vulcanizing. Put on cold at very little cost. Outlasts tire or tube. Sells to every auto owner and accessory dealer. Agents if you want big profits, made quick, write for particulars and free sample to Waltham Rubber Co., 13 South St., Waltham, Mass.

MAKE Your Name Pay Dividends. Sell "Results" polishes and cleansers under your own private label. Every article a leader and business builder. Your name on package controls territory. You get all repeats. Just the thing for Crew Managers. Sub-agents must buy from you. Housewives buy and use "Results" because they get results. So will you. E. N. Norris, 97 E. Fulton St., Bloomfield, N. J.

AGENTS: It's a winner. Combined cigarette and match case. Sells on sight. 100% profit. Write for particulars. All-In-One, Box 64, Minneapolis, Minn.

AGENTS, both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write now. Connolly, 123 Liberty St., New York.

FORMULAS for making your Guaranteed products. All Lines. No Machinery. 300 to 1,200% profit! Stamp brings interesting descriptive literature—Instant Fly-Killing Spray; Delicious Summer Drinks, Best Metal Polishing Cloth, No-Water Hand Soap, Lightning Battery Charger, Mendit, Fabric Patching Liquid, Amazon Tire Weld, Wonder-gloss Shoe Polish, Radiator Repair Liquid, Queen of Soaps, Many others—all lines. State what interests, Highest references—Miller, Chemist 1706-S Jetton, Tampa, Fla.

50c TO \$1.00 profit each sale. No delivering, license nor stock necessary. Bonanza. Free particulars, Mission Factory 519PM, 2328 West Pleno, Los Angeles, Calif.

BE independent. Make—Sell your own specialties. Immense profits. Catalog dependable Formulas, special selected. Agent's best sellers Free. M. Lustru, 832 East Pershing, Chicago.

SELL Archer Made to Order Shoes. Biggest commissions daily. No capital or experience necessary. Dept. Z154. C. W. Archer Shoe Co., Cincinnati, Ohio.

EVERYBODY wants Riding Comfort. Agents install marvelous Air Cushions between leaves of Auto springs. Wonderful flexibility. No lubrication. Year guarantee. Ford; \$2.00 installed, your profit \$1.40 four minutes work. Average car \$1.80. You make \$3.30, twenty minutes. 2,000,000 sold. Send \$1.00 for Ford set or write for details. Money back guarantee. Rideair, 530 W. 27, Los Angeles, Calif.

STARTLING Selling Plan! \$1.25 premium free to every customer on \$2.00 sale of 8-ounce Vanilla, 6-ounce Shampoo and 4-ounce Lemon Lotion. Details and samples free. C. I. Togstad, Dept. 18H, 29 South Clinton, Chicago, Ill.

FREE—Get This Quick! Chicago's Wonder Shirt line. Sell newest, stylish, snap-on, Stylenor Shirts. Amazing values at low prices. Make \$100.00 weekly easy. Complete assortment of large swatches makes selling Stylenor Shirts a cinch. Experience or capital unnecessary. Be your own boss. We will show you how to build a big business of your own. We will deliver and collect. Exclusive territory open. Write today for big free outfit. Stylenor, 81 W. Van Buren, Chicago, Ill. Dept. 1005.

\$50,000. PICTURE Man Friedman made canvassing. Beginners can make \$100.00 weekly with my sales talk. Experienced men make more. Free book, "Profits in Portraits" explains. Samples Free. Picture Man Friedman, Dept. 8H, 541 W. Lake, Chicago.

AGENTS—Meseo Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Co., 278 Searle Bldg., Rochester, N. Y.

AGENTS—\$90 a Week—\$2 to \$5 an hour spare time. Make this with the celebrated line of Ho-Ro-Co Soaps, perfumes, toilet articles and specialties; over 200 items. Big profit makers. La-Em-Strait Hair Dressing selling like hot cakes. Write for Free Sample Case offer. Ho-Ro-Co Mfg. Co., 786 Ho-Ro-Co Bldg., St. Louis, Mo.

AWAY Ahead of Every Thing Else! That's "Zippe" as a seller. Show your sample, talk a minute and pocket your profit. A real Sure-Fire, He-Man Money-Getter that repeats—and say, Boy, it actually sells on a ten second Show-Down. If we didn't know we had a proposition that any man could sell right out of every ten cents, you can bet your sweet life we wouldn't spend money telling you about it. Karam-Smith, 606 F Street, Ft. Wayne, Ind.

MARVELOUS invention! Does away with phonograph needles. Preserves records. Save \$25 in needles. Pays \$90 weekly. Sample on approval is requested. Ever-play, Desk B-6, McClurg Bldg., Chicago.

AGENTS. Salesmen—Sell New Thermo-static Automatic Carburetor Control Attachment for Fords. Big profit, full or part time. Burns 95% air. Doubles Mileage. Attached in 2 minutes. No drilling. Does automatically exactly what Ford manual says do by hand. Cadillac now using Thermo-static Carburetor Control under Blawie license. Write today. A. C. Blawie & Co., Dept. 805HX, 802 Lake St., Chicago.

ONLY one policy a day means \$100 per month profit. Permanent income from renewals. Our Special Policy pays \$5,000 death, and \$25 weekly benefit for stated injury or sickness. Premium \$10 yearly. Big demand. Easy to sell with our Direct-by-Mail plan. Write quick for territory. Underwriters, 702 Bonnell Bldg., Newark, N. J.

AGENTS—Make \$100.00 weekly; ride in Chrysler closed car; show samples and distribute teas, coffee, spices, extracts; things that people eat; 50c out of every \$1.00 is yours. This offer made only to first person answering in your locality. Write or wire, Health-O Quality Products Co., Dept. 100-F, Cincinnati, Ohio.

BIG Money monogramming autos, trunks, bags, etc. Make \$20 to \$25 daily. No experience needed. Samples, information free. Monogram Co., Newark, N. J.

COST \$7.50. Your profit \$312.00.. Transferring decalcomania letters on autos, trunks, bags, etc. Send today for outfit or free samples. Monogram Co., Newark, N. J.

"LIQUID-LEATHER" Fills Holes in Shoes, Rubbers, Tires. Dries Instantly. Pliable, Waterproof. Just Imported from France. Tube Retail 60c—Cost 25c. Sells Housewives, Sub-Agents, Nulife Leather, Hartford, Conn.

AUTOMOBILE Specialties. Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tujunga, Calif.

AGENTS coin money selling "Lanowa" products. Greatest utilities known. Big demand everywhere. Write quick for sample. Fraser Products, 305-J 43rd, Kansas City, Mo.

MAIL-ORDER Houses and Distributors: We pack French made beauty creams, face powders, perfumes, toilet preparations with your label. Chemist, A2700 Wabash Ave., Chicago.

BIG Spring Money-maker. Everybody is polishing furniture and cars these days. Sell Gloss Oil, the wonder polish. Other household necessities. Write today. Duo Co., Dept. GI, Attica, N. Y.

AGENTS: Full or spare time—to sell hand painted scarfs, dollies, pillows. Extremely low priced. A wonderful new process. Our agents are cleaning up. Paintographs practically sell themselves. Write for full particulars of liberal agency offer, and circulars describing Paintographs today. Bradfords, Dept. 60A, St. Joseph, Mich.

\$100 TO \$150 Weekly. Wonder-Automatic Washer. Patented. Does large family washing spotlessly clean in 30 minutes. Creates its own power. Will last a lifetime. Sells for \$7.50. Unusually large commissions. Eureka Supply Co., Dept. 6, Sedalia, Mo.

BIG Money Selling New Household Cleaning Set. Washes and dries windows. Sweeps, scrubs, mops. All complete only \$2.95. Over half profit. Write Harner Brush Works, 132 3rd St., Fairfield, Iowa.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 2480, St. Louis.

BIG Money—fast sales; everyone buys gold initials for their autos; sell \$1.50, profit \$1.44. Ten orders daily easy. Samples, information free. World Monogram, Dept. 16, Newark, N. J.

GIVE Away finest laundry soap Free. You'll make \$10 daily easy by new selling plan. Big repeat business. Write quick. Wolverine Soap Co., 28 Wolverine Bldg., Grand Rapids, Mich.

AT Last! Diamond Rival Discovered! Amazing blue white Rajah Gem astounds jewelry world and deceives experts! Beautiful Sample case Free! \$100 weekly! Write Quick! Rajah Diamond Co., Dept. F-7, Salisbury, N. C.

AGENTS: 500% profit. "Happy Home Maker Shampoo" builds your own business. Martin of Indiana made \$75.00 in one day. Missouri man made \$750.00 one month. Exclusive territory. Geo. Schmidt & Co., Dept F, 236 W. North Ave., Chicago.

300% PROFIT—Quick Seller—Fast repeater. Sample Free. Restever Products Co., 1941-PM Irving Park, Chicago.

AGENTS \$1. Retail \$3. Your Profit \$2. Wonderful pocket Adding Machine with Magic Writing Pad. Particulars Free. Typewriter Supply, 905 Hersh Bldg., Pittsburgh, Pa.

SELL by mail! Big Profits! Banks, Formulas, Novelties, Margains. Particulars Free! Elco, 523 South Dearborn Street, Chicago.

REPLATE brassy worn-off Automobile parts. Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. \$1.00 half pints postpaid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

BUILD big permanent business. Toilet preparations, Double Strength Extracts, soft drink powders, other household necessities. Write today. Duo Co., Dept. XI, Attica, N. Y.

EVERYBODY Buys Davis' Nifty Toilet Goods Assortments. Useful, handsome gifts free to our customers. Over 250 high quality products. All repeaters. 100% profit. 25 years of success. Write Davis Products Co., Dept. 56, Chicago.

PORTRAITS, photo pillow tops, frames, sheet pictures, medallions, merchant's signs, food products, photo jewelry, guaranteed hose, toilet requisites, luminous crucifixes. Catalog 50 specialties free. 30 days' credit. Jas. C. Bailey Co., Sta. C, Chicago.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

POLMET—The Wonderful Polishing Cloth that cleans all metals without liquid, paste or powder. Approved by "Good Housekeeping" and "Modern Priscilla"—sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

AGENTS—Send for free sample "Fretnot"—washday wonder. You can clear at least \$20 to \$100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory. Credit given. Empire Specialties Co., 1549 N. Wells, Dept. 101, Chicago.

FREE Booklet describes 52 plans for making \$20.00 to \$100.00 weekly in home or office business of your own. Downs Co., 2323A Myrtle, St. Paul, Minn.

AGENTS—\$60 to \$200 weekly putting up our Burnished Genuine Gold window letters; scripts. Experience unnecessary. Free samples. Prensler Letter Co., 121 N. Francisco, Chicago.

66 MILES on 1 Gallon—Amazing new Gas Saver. All autos. 1 free. Critchlow, N-132, Wheaton, Ill.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

BUSINESS Guide with Free Legal Service Sells everywhere; Wells cleared \$1,187 in 33 days. Write for free outfit. Nichols Co., Naperville, Ill. Dept. 4B.

\$5,000 YEARLY easy, selling our money-making specialties; we undersell them all. Catalog free. Samples 25c. Mills Sales Co., 13 East 16th Street, New York.

EARN \$10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, handlights. Outfits furnished. E. Delea Laboratories, 1133 Broadway, New York.

AGENTS: Big Money Monogramming by Transfer Method. Catalog Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

AGENTS: Our gold-eyed Needle Cases are wonderful sellers; immense profits: \$50 to \$300 weekly; proof and particulars free; sample outfit 15c; factory prices. Paty Needle Co., 231 Davis Square, Somerville, Mass.

AGENTS—Sell 5c fast selling candy specialties to stores. Big profits. Lorrac Products Co., Albany, N. Y.

INSTANT Weld. Repairs largest punctures without cement or heat. Lenn's profit one day, \$50. Write quick. Free sample; territory going fast. Tourists' Pride Mfg. Co., Desk T, Minneapolis, Minn.

350% PROFIT. Everybody buys. Fast-selling article needed in every home. Weaver, Box 615, Philadelphia, Pa.

OVER 100% Profit. Self Lighting Gas and Cigar Lighters; Everybody interested, repeat business. Sell individuals, dealers, subagents. Particulars Free. P. Bernhardt, 127 West 30th St., New York.

SOMETHING New—"Handy Packet." An attractively put up package of useful household necessities. Positively a sale in every home; fine side line; big profits. Send for sample. Prentice-Lee, 145 East 23rd St., New York.

WONDERFUL! Startling! Amazing! Our Ex-Cel Luminous Crucifix and Marical (Luminous) Necklace shine brilliantly in the dark. Sell on first demonstration. Big profits to you. Write for further particulars, or better still, send for sample and territory protection immediately. Crucifix \$1.50 Necklace \$1.00, postpaid. W. G. Hannan Co., Dept. B, 2739 So. State St., Chicago.

WILLIAMS' No-Water Hand Soap. In tubes. Has taken Auto owners by storm; washes dirtiest hands perfectly clean without water; easy demonstration makes quick sale. 150% profit. Williams Co., Dept. 265 Montclair, N. J.

A \$5,000 A YEAR Job. You can make it worth that and more. 400% to 600% profits selling Perry Photo Medallions. No portraits so desirable. Indestructible, hand-colored, fade-proof. Built from photo supplied by customer. Guaranteed. No money risk. No margin of profit so big in any other line. Write. Perry Photo Novelty Corp., 1793 Jerome Ave., Dept. PM, New York.

AGENTS make \$3.00 an hour taking orders for our 40 Fascinating Kitchen Specialties. No competition. Write quick. General Products Co., Dept. 7K, Newark, N. J.

FIBRE Brooms—detachable handles, fine finish. Good profits, repeat sales. The Fibre Broom People, 147 New Jersey Ave., Brooklyn, N. Y.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

EASY, pleasant work for Mechanics. Shop Men, Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

AGENTS—N-R-G Laundry Tablets, the old reliable money-maker for live agents. Millions sold—200% profit—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 230 W. Superior, Chicago.

GENUINE Gold Leaf Letters anyone can put on Store windows. Guaranteed to never tarnish. Large Profits. Enormous Demand. Free Samples. Write today. Metallic Letter Co., 438-A North Clark, Chicago.

AGENTS—\$240 a month. Take orders for well known line of household specialties, food flavors, toilet preparations, etc. Full or spare time. Build a big permanent business. Must satisfy or money back. Write for free sample outfit and offer. C. H. Stuart & Co., 5567 Main, Newark, N. Y.

AGENTS make \$100 week placing advertising Cigar Lighters with glass front. Every dealer wants one. Write for free plan. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

AGENTS—Good salary and commission selling "Ratskyl," new rat and mouse exterminator; ready for use; no bait required; non-poisonous; rodents die outside premises; no odor. Empire Specialties Co., 1549 N. Wells, Dept. 301, Chicago, Ill.

MAKE and Sell Your Own Goods. Tremendous profits. No Machinery. No experience. We show you how. Catalog Free. Clover Laboratories, Park Ridge, Ill.

NOW that you have read all these offers, read Macohee Company (Cincinnati, Ohio) advertisement again.

HIGH GRADE SALESMEN WANTED

BIG Profits: 80c every \$1 sale. New Guaranteed Auto Discovery. Fast repeater. Specialty Mfg. Co., Boone, Iowa.

RESPONSIBLE man in every city and town to demonstrate and distribute advertising material. No talking necessary. No experience. All year round outdoor work. Full or part time. Good money. Write for complete Free Instructions. M. Ewing, Sales Manager, 120 W. Austin Ave., Chicago.

SALESMEN: The opportunity of a life time awaits you if you act quick. Get busy and get yours. Write or wire this minute. M. F. Bronner, 11 Columbia St., Boston, Mass.

SALESMEN: Galactite, the most successful patented puncture-proofing compound for auto tires, is making \$5,000 to \$10,000 a year for our hundreds of authorized representatives. Sells to car owners and dealers in big quantities. Seals any puncture instantly and makes tire puncture-proof for life. Positively guaranteed. Backed by a large, well financed corporation of long standing. Complete elaborate outfit and extensive advertising co-operation ready to back you in your community. The best money-making proposition ever offered you. Write at once to C. F. Johnson & Co., 19 West Jackson Blvd., Dept. 153, Chicago.

SALESMEN: New plan selling our complete line of sanitary products, insecticides and cleaning compounds, through direct representatives to homes, restaurants, hotels, etc., opens new opportunity to get a line known for over quarter century. Every woman buys special Sanitary Household Package. Products guaranteed. 40% commission. We deliver. Write for special offer. The Chamberlain-Haber Chemical Co., 1114 West 11th St., Cleveland, Ohio.

DISTRICT Salesman: Must be reliable. Prefer married man, 30 years old or over, and permanent resident in his community. Exceptional opportunity for good man. Address Dept. 874, William C. Bartlett, Inc., 871 W. Adams St., Chicago.

CALIFORNIA Rosebuds selling like hot cakes. Agents colning money. Absolutely new. Big profits. Catalog free. Mission Factory SP, 2328 West Pico, Los Angeles, Calif.

FURNITURE refinishing, polishing, painting, handyman shop; wonderful profits; start yours on nearly nothing. John Bruceland, 1457 So. Ninth, Philadelphia, Pa.

AS side line, or in spare time, sell janitor supplies, to Public Buildings, Merchants, etc. Big demand. Big money. No investment. Continental Mfg. Co., Indianapolis, Ind.

MR. BRUSH Salesmen: Old Established New York Brush Manufacturer requires the service of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commissions than any other Brush House in the country. Write immediately for proposition. Wire Grip Sanitary Brush Corp., 15 Mercer St., New York.

COLLECTS Money from the Dead-Beats. Retaila \$5.00—Cost \$1.00—Profit \$4.00. "New Method." Every Storekeeper, Doctor buys quickly. Wonderful Money Getter. Federal Association, Hartford, Conn.

A PAYING Position Open to representative of character. Take orders shoes—hostelry direct to wearer. Good income. Permanent. Write now. Tanners Shoe Mfg. Co., 4-410 C St., Boston, Mass.

SELL labels. Many territories open. Excellent commissions. Willson Spielmann Label Co., 538 Lake Shore Drive, Chicago.

MEN—Working garage trade for brake relining machine; new invention; costs one-fifth other devices; does perfect job in half usual time; weighs 15 pounds; does beautiful work; demonstrates pretty in five minutes; big money-making opportunity. Bear Manufacturing Company, Rock Island, Ill.

SALESMEN—Get this big sensational order-getting shirt outfit free. Sell Strle-mor Shirts all year round. It's Chicago's Wonder shirt line. Advanced Spring Showing of smartest, snappy patterns. Large double swatches, low prices, quick service, makes shirt selling easy. Bellard of Texas made \$40.00 in two days. We deliver and collect. Write today for big free outfit. Stylenor, 81 W. Van Buren, Chicago, Ill. Dept. 1195.

NEWEST Invention! Sells everywhere. Automatically prevents telephone and iron cords from tangling and kinking. \$90 weekly. - Samples for tests if desired. Never-knot, Dept. 6-1, McClurg Bldg., Chicago.

SALESMEN—A complete advertising novelty line: Thermometers, Phone Specialties, etc. Liberal commissions—side line or full time. Write Stanwood-Hillson Corp'n. 3 Tremont Row, Dept. S, Boston, Mass.

SALESMEN wanted:—Part or full time. Specialty men who are live wires to sell our new improved check-writer. "The little check-writer with the big protection." A real office necessity. Popular price of \$12.50 makes it a big seller. Exclusive territory to men who can show results. Arnold Check Writer Co., Inc., 837 East Taylor St., Flint, Mich.

GENERAL Distributors. every city, earn \$75 to \$150.00 weekly handling "Tartaroff," a repeat order product that sells to drug, department, novelty, news, cigar and general stores. Our placement sales plan requires no selling experience; results accrue over night, repeats follow rapidly; get our "Acid test" offer; fullest, squarest liberal proposition; this 20th century whirlwind business can be yours. Write Tartaroff Co., 2568 KA, Lincoln Ave., Chicago.

AMAZING new invention, sells every office. Big commission. Weaver made \$23.40 first two hours. Others earning money. Write today. Stenograph, 1271 California, San Francisco.

ARE You Old at Forty? See our advertisement on page 146 of this issue. The Electro Thermal Company, 2158 Main Street, Steubenville, Ohio.

SALESMEN—Make profitable, permanent connection with national organization selling posed from life film advertising. Exclusive territory. Write for full particulars. Monarch Film Company, Waterloo, Iowa.

66 MILES on 1 Gallon—Amazing new Gas Saver. All autos. 1 free. Critchlow, R-132, Wheaton, Ill.

SIDE-LINE Salesmen make good commission on picking up trade-mark prospects for old, established bureau. No samples, no investment. Write for proposition. Mida's, Inc., Terminals Bldg., Chicago.

WANT representative each locality. Old established business. Write giving references. Foggi & Montalvo, 150 West 10th St., New York City.

GOLD Leaf Window Letters and Script Signs. No experience; 500% profit. Samples free. Consolidated, 636V, South Dearborn, Chicago.

SALESMEN—To sell the wonderful "Liebold's Toothache Drops" which gives instant relief. Sold in all drug stores. 40% profit. Sample bottle 40c. F. J. Liebold, Druggist, Adrian, Minn.

SALESMEN—Make big money selling merchants, banks and offices. Our whirlwind selling specialty. Absolute necessity. A. R. Manufacturing Co., 2728 Lisbon Ave., Milwaukee, Wis.

SALESMEN—Big commissions earned daily. Sell dependable make shirts of genuine imported English broadcloth; values unbeatable. Capital, experience, unnecessary. Pocket-Kit free. Merit Shirt Co., 640 P, Broadway, New York.

A WHIRLWIND seller—something new and unique. Radio Peds—nothing else like them—large profits! Write today. Heloni, 5054 Calhoun St., Ft. Wayne, Ind.

ADVERTISING Salesmen wanted to take orders for Auto Key Purse; new invention; sells to advertisers by thousands; commission 20%; sample by mail 25c. Novelty Cutlery Company, 522 McGregor Ave., Canton, Ohio.

BECOME Your Home Town's Leading Business Man. Big money. Easy work. Selling groceries, coffee, canned goods, auto oils, men's shirts, ladies' hosiery direct to consumer. Undersell competition. Commission advanced. Liberal credit plan. No experience or capital necessary. Laverin & Brown Co., 1775 So. State, Chicago.

DISTRIBUTORS wanted for Mystifying Radio Gas Lighters and Masterlite Clear Lighters. Everybody interested. Sell to consumers, dealers. Big profits. Steady business. Selling Plans free. M. Masterlite Co., 110 E. 23rd St., New York.

MINUTES Pay Dollars demonstrating wonderful three pound Calculator. Retail \$15.00. Work equals \$300 machines. Adds, subtracts, multiplies, divides automatically. Five year guarantee. Big demand; large profits, experience unnecessary. Write quick for liberal trial offer and protected territory. Lightning Calculator Co., Dept. F, Grand Rapids, Mich.

SALESMEN—Become Independent. Own Your business, experience unnecessary selling our \$7,500.00 Accidental Death; \$50 Accident; \$25 Sick Weekly Benefits—\$12.50 Yearly. Other Amounts proportionate. Guaranteed steady income from renewals. \$250,000 Deposited Insurance Department. Universal Policy, Dept. A, 30 Clinton St., Newark, N. J.

FOUR \$7.50 sales to merchants net you \$20.00 daily. Sayers Systems, 2303 Sheffield Ave., Chicago, Ill.

TRAVELING Salesman calling on retail stores wanted by large manufacturer to sell unique line of business-boosting articles. Year round, fast selling, main or side line. If not earning \$150 weekly, address Union Specialty Works, Inc., 222 Charles St., Booneville, N. Y.

WANTED—Tailoring Salesmen, make \$60 to \$125 per week. Biggest merchants in many towns have started with our line. We are the largest made-to-measure tailoring house in the country, furnishing elaborate sample equipments, including 500 all-wool fabrics. You make your own profits from \$8.00 to \$15.00 on each order. Guaranteed absolute satisfaction, perfect fit, best workmanship, or no sale. Write for our line and all accessories to be sent free. Tell us all about yourself. Address N. O. Perry, Sales Manager, Box 483, Chicago, Ill.

SALESMEN—Selling Supreme Shirts means big business, big repeats, big commissions. Write today for Free Kit. Supreme Shirt Co., 276-in Fifth Ave., New York.

YOUR trade uses salesboards. Make up to \$35 on single sale. Largest, lowest priced line. No samples to carry. Elaborate 3-color catalog free. Lincoln Sales Co., Dept. D, 9 So. Clinton, Chicago.

TAKE orders for coffee, sugar, flour, meats, canned goods, staple groceries also paints, radio sets, tires, auto and tractor oils. No capital or bond required. We deliver and collect. Permanent business. Big pay. Write at once. Hitchcock-Hill Co., Dent 50, Chicago.

SELLS for \$9.75. Prints ad on wrapping paper, envelopes, etc. \$4.00 commission. Send 10c for sample work. Automatic Ad-Stamp, Joplin, Mo.

SALESMEN Can make \$5.00 a day selling our Calendars, Pencils, Signs, Advertising Novelties, Yardsticks, Whistles, etc. Liberal terms. Sells entire year. Fine side line. Local and traveling agents. Model Calendar Co., Dept. 228, South Bend, Ind.

\$60-\$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

EASY Selling Specialty. Beautiful Attractive, Appealing, Luminite Window Bulletin. Increase merchants' business 50% to 100%. Protected territory. \$8 commission on each \$20 sale. Thousands being sold; sells itself on demonstration. Display Products Co., Ltd., A 210W Elzabeth St., Kansas City, Mo.

IF you think in Terms of \$6,000 the First Year write Us Now. Strong line for retail stores. Nationally advertised. Established concern. Best season now starting. Liberal weekly advance to producer. The Continental Co., 1300 Liberty Bldg., Cleveland, Ohio.

BIG opportunity for salesmen to make much extra money selling our new patented automobile and Yale lock key case. A big repeater with good large margin for salesmen. Write us for complete proposition. Exclusive territory. Sample for quarter. Minnesota Specialty Company, 78 E. Third St., St. Paul, Minn.

HELP WANTED

A BUSINESS of Your Own Pays Best. Men and women are finding rich fields everywhere operating Ragsdale's Original "New System Specialty Candy Factories." Wholesale or retail, all or spare time. Under new plan we furnish everything and teach you fully. Few dollars establishes permanent, big paying business. Valuable Commercial Candy Book Free. W. Hilper Ragsdale, Drawer 350, East Orange, N. J.

WORK for Uncle Sam. Get Government Jobs. Men—women, 18 up. Commence \$95 to \$158 month. Short hours. Paid vacations. No layoffs. Full unnecessary. Common education sufficient. Candidates coached without leaving home. Full particulars and 32 page book—Free. Write immediately. Today sure. Franklin Institute, Dept. S3, Rochester, N. Y.

MEN, 18 up, wanting U. S. Mail Service positions. \$142 to \$225 monthly; steady; experience or correspondence course unnecessary; details free. Write P. Bradford, 112 N. 50th St., Philadelphia, Pa.

86 MILES on 1 Gallon—Amazing new Gas Saver. All autos. 1 free. Critchlow, R-132, Wheaton, Ill.

MANUSCRIPTS Wanted: Stories, Poems, Articles, Plays, etc. We help authors. Submit manuscripts to Writers' Society, 603, Hannah St., Mo.

MEN 18-35. Become Railway Postal Clerks. Steady. Commence \$1,900 year. Common education sufficient. Specimen coaching free. Write immediately. Franklin Institute, Dept. S16, Rochester, N. Y.

BIG Profits; 85c every \$1 sale. New Guaranteed Auto discovery. Fast repeater. Specialty Mfg. Co., Boone, Iowa.

\$12 DAILY easy, taking orders for Largest Line New Style Guaranteed Hosiery. Cotton, Hisle, chifton, silk. All latest shades and colors. Bunny, Orchid, Blush, Pawn, Harvest. Prices greatly reduced. Special premiums to purchasers make sales easy. Send for Proof of Profits—Free. Macoshee Company, Card 2666, Cincinnati, Ohio.

LOCOMOTIVE Firemen for railroads nearest their homes—everywhere; beginners \$150—\$250 monthly; promoted, locomotive engineer, \$3,000—\$4,000 yearly. Best paying positions on railroads. Railway Association, Desk M1, Brooklyn, N. Y.

GET posted—good prices paid for butterflies, insects. See Sinclair display advertisement, page 21.

UNUSUAL opportunity to make big money. Our men are making \$75.00 to \$100.00 every week. Fastest selling article on the market today. Whirlwind demonstrator. Big repeater. For our special offer to representatives write at once to the Jay Manufacturing Company, Desk 52, 1012 Fourth Avenue, Los Angeles, Calif.

BOYS—Men, 16 Up Wanted. Learn Expert Automobile Repairing. Positions always open. \$35 week up. Learn at home while earning. Sample lessons free. Write immediately. Franklin Institute, Dept. S 400, Rochester, N. Y.

MEN wanting forest ranger, railway mail clerk and other gov. positions. Write for particulars. Mokano, R-23, Denver, Colo.

MIRRORS Re-Silvered at Home. Costs Less 5 cents per square foot; you charge 75 cents. Immense profits, plating autographs, reflectors, tableware, stoves. Refinishing metalware, etc. Outfits furnished. Write for information. Sprinkle, Plater, 77, Marion, Ind.

\$1,700—\$2,100 YEAR. Mail Carriers. Men 18—35. Sample examination coaching free. Write today sure. Franklin Institute, Dept. S16, Rochester, N. Y.

QUALIFY for \$150—\$300 railroad jobs. Fireman, Brakeman, Baggageman, Sleeping Car or Train Porter. \$10 Railway Bureau, East St. Louis, Ill.

MAKE money writing Photo-plays; details free to beginners. No correspondence course. Producer's League, 230 Wainwright, St. Louis.

RAILWAY Postal Clerks. Commence \$158 month. Men 18—35. Sample coaching lesson free. Franklin Institute, Dept. S16, Rochester, N. Y.

BECOME Railway Postal Clerks. Commence \$158 month. Sample coaching free. Franklin Institute, Dept. S16, Rochester, N. Y.

DON'T prepare for any Civil Service Examination without seeing our catalogue. Free. Columbian Correspondence College, Washington, D. C.

EARN \$10 daily silvering mirrors, plating and refinishing metalware, auto, chandeliers, bedsteads, headlights. Outfits furnished. E. Deele Laboratories, 1133 Broadway, New York.

FINGER Print Experts—Excellent paying positions; particulars free. Finger Print Headquarters, 188 East 9th, New York.

\$115—\$400 MONTHLY paid—By Station—office positions. Free passes, experience unnecessary. Write Baker, Supt., (ABT) Star Bldg., St. Louis, Mo.

STEAMSHIP Positions—Europe, Orient. Good pay. Experience unnecessary. No compulsory service. Send stamped addressed envelope for list. Box 30-X, Mount Vernon, N. Y., or Box 236-A, Santa Monica, Calif.

SILVERING Mirrors, French plate. Easily learned; immense profits. Plans free. Address. Wear Mirror Works, Dept. 34, Excelsior Springs, Mo.

INVENTORS desiring to secure patents should write for our book "How to Get Your Patent," tells our terms and methods. Send sketch for our examination and instructions without charge. Randolph & Co., Dept. 418, Washington, D. C.

MEN wanting forest ranger positions, \$1,500—\$2,400 year. Write for free particulars of exams. Mokano, R-21, Denver, Colo.

BUILD splendid business making colored glass number and name plates, signs, checkerboards. Write for particulars. Simplex Utility Co., 1133 Broadway, New York.

ALL men—women, 18-60, wanting to qualify for Government Positions, \$140—\$225 monthly, local or traveling, write Mr. Ozment, 101, St. Louis, Mo., immediately.

U. S. GOVERNMENT wants men. \$1,700—\$1,900 and up at start. Railway Mail clerk examination coming. Let our expert (former Government examiner) prepare you for this and also Rural Carrier, Post Office, Customs, Internal Revenue, and other branches. Write today for free booklet, Dept. S, Patterson Civil Service School, Rochester, N. Y.

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ACCURATE, complete information on any one subject \$2.00. Michigan Information Bureau, 1337 Hamilton, Flint, Mich.

RELIABLE technical and research information promptly supplied at reasonable charge. Hillcrest Co., 1110 Drummond Place, Chicago, Ill.

ACCURATE specific information on any one subject \$5.00. National Information Bureau, 316A Shepard Building, Grand Rapids, Mich. Prompt service, satisfaction guaranteed.

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COMPLETE solution of any one business problem \$5.00. Michigan Information Bureau, 1337 Hamilton, Flint, Mich.

REPRESENTATION. Information. Mail address in Washington, D. C. State your need. Service, 517 Kresge Bldg.

CHARTERS—Delaware: best, cheapest; free forms. Colonial Charter Co., Wilmington, Del. (99)

DELAWARE Incorporator. Charters: Fees Small; forms. Chas. G. Guyer, 901 Orange St., Wilmington, Del.

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UNDERWOOD Typewriters—only \$3.00 down. Easy monthly payments. Low prices at less than manufacturers. 10 days' free trial. Rebuilt, all worn parts replaced. Just like a new machine. 5-year guarantee. Write for a big free catalogue A-151. Shuman-Ward Mfg. Co., 1515 Shipman Bldg., Chicago, Ill.

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TYPEWRITERS \$5—\$35. Motorcycles, cars, \$20—\$75. Knights, 1512 Locust, St. Louis, Mo.

TYPEWRITERS, all standard makes, thoroughly re-manufactured by the famous "Young Process" and shipped direct from factory to you on 10 days' trial. Guaranteed 5 years. Easy monthly payments. Write today for free catalog. Young Typewriter Company, Dept. 3756, 643 W. Randolph St., Chicago.

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100 TYPEWRITERS Free. Overstocked. Rent rebuilt Underwood or Remington \$3.00 month. If you pay its value in rental, we give machine free. Particulars free. Pittsburgh Typewriter Exchange, 915 Hersch Bldg., Pittsburgh, Pa.

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\$3.00 DELIVERED. 500 Watermarked Bond Letterheads, 8½x11, and 250 envelopes, money with order. Job Printing Specialty. National Printing Company, Goshen, Ind.

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MULTIGRAPHED letters. 500. \$2.50; 1,000, \$3.00. Typewriting 50c per thousand words. Excel Service, 135 Liberty St., New York.

500 BOND letterheads \$1.60. Roe Art Printer, Carleton, Mich.

PRE-USED Printing Presses, Type supplies. List for 2c stamp. Popular Bargains, Richland, Pa.

LETTERHEADS, Envelopes, Cards, Billheads. Business and Professional use. The Arrow Press, Kankakee, Ill.

COMMERCIAL Printing. Prices Right. Samples Free. The Fox Press, Frankfort, N. Y.

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GUARANTEED Printing should have your preference. Fifty expert printers. Secure our prices. We print anything but money and postage stamps. Waverly Publishing Co., Box 9, Waverly, Iowa.

250 EACH Hammermill Bond Letterheads. Envelopes, \$3.00. Samples. Midland Press, 543 West Hickory, Kankakee, Ill.

250 LETTERHEADS and 250 Envelopes Printed for \$2.50. Samples. Shepard Printing Co., Wheaton, Ill.

GUMMED Labels, with name, business and address, 500-25c; 1,000-40c; 3,000-\$1.00. Samples. Combination Calendar Blotting Cards. Label Printers, Valhalla, New York.

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QUALITY Printing! Reasonable Prices! Send for Free Standardized samples and prices. Folders, Circulars, Catalogs our specialty. Ernest Fantus, 525 South Dearborn, Chicago.

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225 BOND letterheads, envelopes, billheads, cards, \$1.25 each. Combination, \$1.00. Economic Press, Leonia, N. J.

GUMMED Labels, 500 name and address, 2 lines 35c. 3 lines 55c. Catalogue. Eastern Label Co., B. Clintonville, Conn.

100 BOND Letter Heads, and 100 Envelopes, postpaid, \$1.00. E. Easterly, Box 335, Johnson City, Tenn.

MULTIGRAPHING, typewriting, business correspondence, two dollars, thousand. Letterheads, three dollars. Mayeray Corporation, Monmouth, Ill.

1,000 BOND Letterheads; \$2.95 Delivered. Atoka Press, Atoka, Okla.

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COMPLETE printing outfits, presses, type, ink, paper supplies. Write for Catalog. Press Co., C-11, Meriden, Conn.

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YOU can make 50 to 100 copies of a letter, notice, etc., at a cost of three cents on a Hoyer Quality Duplicator. Write for free trial offer. The Hoyer Duplicator Co., 14 S. Wells St., Chicago, Ill.

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NEW \$3.50 Automatic Adding Machine. Adds, Subtracts, Multiplies. Absolutely accurate. Capacity \$999,999.99. Fully guaranteed. 75,000 pleased users. Makes adding easy, positive, quick. Eliminates mistakes. Saves Time. Postpaid \$3.50. Bassett Co., 1458 A Hollywood Ave., Chicago.

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MUSIC stamps, rubber type catalogue 25c. ¼ lb. sweet pecans 40c. W. Karstaedt, Dayton, Ohio.

RUBBER Stamps, Stencils, and allied Products. Advance, 180 Harman St., Brooklyn, N. Y.

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CHICAGO High School Graduates, June 1926, 2,100 Girls, 1,400 Boys, \$25. Compiled April 1926. Guaranteed correct. Less quantity \$10. Thousand. Bernard Henry, 3639 Lawrence Ave., Chicago.

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500 LIVE Wire Agents Special for \$1.00. A. B. Eloyd Agency, 15 South Julia, Mobile, Ala.

A RESULT Producing Mailing List. Lady buyers of beauty clays and toilet preparations, absolutely guaranteed all fresh names \$3.00 per thousand. W. A. Heise, 1315 Steiner St., San Francisco, Calif.

GUARANTEED lists, \$4.00 thousand. Mailing. Richmond Sales Service, Box 225, Richmond, Va.

NAMES—100 \$1.00. Ben Meyer, 35 West 31st, New York.

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HOMESPUN Tobacco. Guaranteed. Chewing five pounds \$1.50; 10 \$2.50. Smoking, 10, \$1.50. Pipe free. Pay when received. United Farmers, Bardwell, Ky.

SEND 10c and we will mail you postpaid the new Kleenpipe Filter. "Makes Smoking Delightful." Coll-ette Specialty Co., Gouverneur, N. Y.

NATURAL Leaf Smoking Tobacco; Aged in bulk. Two years old—mellow and sweet. 5 lbs. \$1.00; 10 lbs. \$1.75. Pipe given. Satisfaction guaranteed. Farmers Union, Mayfield, Ky.

SCOTCH Clayschaum, the only pipe fit to smoke. Special clay absorbs nicotine, conserves health. Twelve, one dollar; six, sixty cents; postpaid. Scotch Clayschaum Company, Importers, Dept. 12-R, Laurel, Md.

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BUILD your own boat. Do your own concrete work. Two new books tell how to make 21 kinds of boats and 173 articles from concrete. Each book filled with pictures. Send No Money. Just write a postal and say, "Send Popular Mechanics Boat Book and Concrete Handbook." Pay postman postage and \$1. Popular Mechanics Press, Room 806, 200 E. Ontario St., Chicago, Ill.

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BOATMEN: Parts to convert Ford motors, lightweight base, \$25. Watercooled manifold \$18. Coupling \$4. Rearstarters. Standard Mfg. Co., 230 Hawley St., Rochester, N. Y.

BUILD your own boat: Newly designed. Speedy V-Bottom out-board motor, runabouts. Cabin Cruisers. Knock-down or patterns. 55 Models. Send 25c for catalogue. Brooks Boat Co., Inc., Rust Ave., Saginaw, W. S. Michigan.

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WHETABLE razor, changeable blade; patent pending; circular free. Cutting Sons, Campbell, Calif.

GENUINE Gillette blades. (10's) 75 cents. Wallace Kutz, 132 Chambers, Philadelphia, N. J.

NEW Blades for Gillette's sample dozen 50c, with razor 75c postpaid. Midwest Company, 1306 Main, Kansas City, Mo.

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BUILD Your Phonograph. Spring Motors, Electric Motors, Tonearms, Amplifiers, Accessories. Latest Equipment also in Radio Mechanism and Cabinets. Catalog mailed for ten cents. Hoosier Mfg. & Supply Co., 313 Baldwin Block, Indianapolis, Ind.

BUILD your own Phonograph. We furnish everything. Write for catalog. American Phonograph Co., 3752 Belmont, Chicago.

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GOLD Plated Strings—Violin (E) 10 cents each. \$0.75 Per Dozen. Tender Banjo \$0.55 per set. J. J. Brunyl, 39 Belden Ave., Norwalk, Conn.

AN amazing new invention. Play your favorite stringed instrument without knowledge of music and without reading notes. We guarantee you can play popular pieces in one evening. Perry & Co., Dept. 877-A, Chicago. See our ad on page 162.

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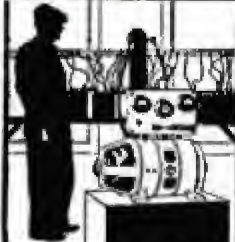
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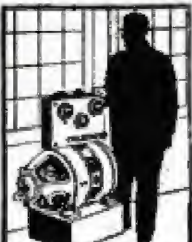
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ARE you in the same hole I was in?

Are you stuck in the rut of *hard work and poor pay?*

Are you dissatisfied with your *job, your income and your prospects?*

Are you having a struggle to make both ends meet?

Are you putting up with the *crumbs* of life while others are getting all the *cake?*

Then you are the man I want to talk to.

LISTEN!

When I made up my mind to get started in the real estate business, in my spare time, I was receiving a salary of \$100 a month.

I was doing work I was not fitted for and which I thoroughly disliked.

I was living in a gloomy boarding-house, wearing cheap clothes, striving to keep out of debt, and getting mighty few of the good things of life.

In less than two years after I started to specialize in real estate, I was making nearly *one thousand dollars a month*. And in less than five years, I cleaned up a net profit of *over one hundred thousand dollars*.

To get the whole story of my success in real estate, and how you, too, can succeed, write at once for my free book, "How to Become a Real Estate Specialist." It contains *my history and your opportunity*.

Follow In My Footsteps

I have studied real estate conditions in this country very carefully, and my investigations convince me that the next ten years are going to be banner years for real estate.



Put your name before the world

Furthermore, my experience satisfies me that there is no better business to get into. It is more healthful than most indoor jobs—you can start in spare time—you can begin with little or no capital—it does not require years of study like medicine, pharmacy, dentistry, law, engineering, electricity, architecture, etc.—the beginner is paid the same rate of commission as old timers—the business is practically unlimited—it is estimated that there are thirty million properties in the country, and that ten million of them are always on the market—it is a permanent business, not affected by fads or fashions—it is constantly growing as population increases—it puts you in touch with the best people—it is a dignified, pleasant and worthy occupation with great possibilities for big profits.

What Others Are Doing

As positive proof of the success of my modern methods read the following brief extracts of some of the letters that come to me from those who are using my scientific system—following in my footsteps—making money my way:

"Your methods fitted me for position as Sales Manager of largest contractors' and builders' real estate department in our city."—*Henry J. Dwyllard, Michigan.*

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"Have been helped a great deal by your system. I have now a new car, two new typewriters, a stenographer, and a dandy office and money in the bank, all through my own efforts and without any capital to start with."—*Mrs. A. Moore, Connecticut.*

"Made \$292 yesterday, through your system, by exchanging two houses."—*B. R. Young, Michigan.*

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"Have made \$14,400 since starting your system. Glad to recommend your methods."—*H. G. Stewart, Florida.*

Act Promptly

There isn't room here for any more such letters, but mail the coupon *now*—before you lay this magazine aside—and receive, without cost or obligation, a copy of my new book, "How to Become a Real Estate Specialist." From it you will learn how you can use my successful system to make money my way—how you can get started right at home—in your spare time—without capital or experience—and establish yourself as a Real Estate Specialist, in a high-grade, money-making business of your own.

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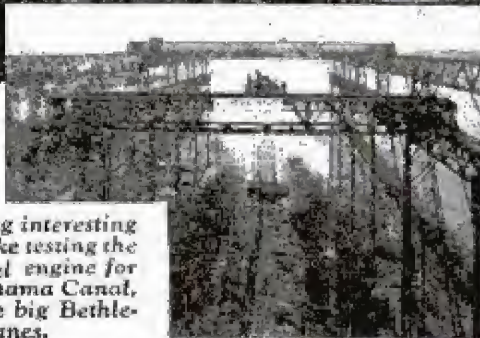
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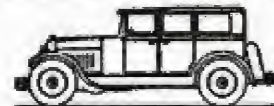


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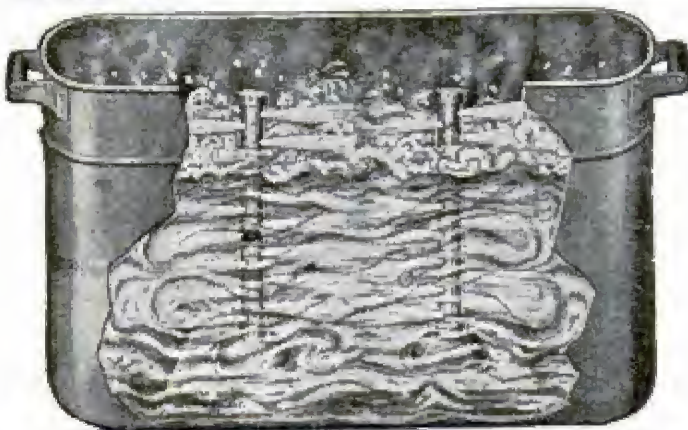
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Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, Jr., who, having been duly sworn according to law, deposes and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the publication in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. R. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Second. That the owners are: If the publication is owned by an individual his name and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock should be given; L. R. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill.; Lina B. Windsor and Henry H. Windsor, Jr., Executors of the Estate of Henry H. Windsor, deceased, Chicago, Ill. Third. That the known owners, proprietors, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are: (If there are none, so stated.) None. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of the owners, stockholders, and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the any other person, association, or other securities than as so stated by him. H. H. WINDSOR, Jr., Editor and Business Manager. Sworn to and subscribed before me this 20th day of March, 1926. J. GRAHAM, Notary Public. (My commission expires June 17, 1928.)



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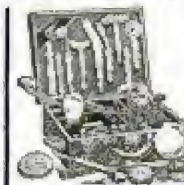
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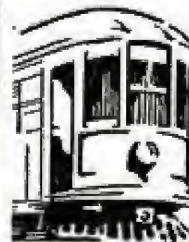
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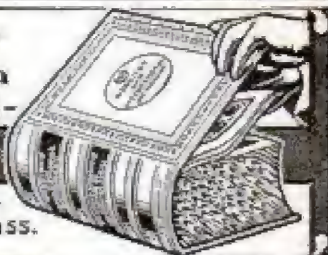
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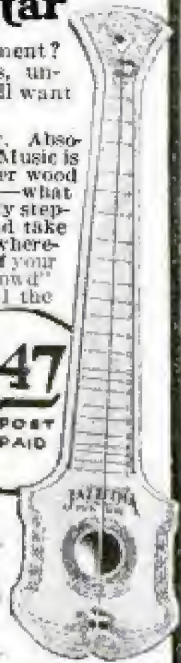
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Please send me the free book explaining your method of Physical Development, with pictures of yourself and your pupils.

Name

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What will cause your death—and when?

NOTE: If you value your health and life here are some facts that will shock you into *thinking more about your body*. It is almost beyond belief, yet true, that *eight hundred thousand people die* in the United States every year of *preventable disease*.

Everywhere we hear people say: "He was the picture of health just a week ago, and now he is gone." "He finished a round of golf, went into the clubhouse, and fifteen minutes later we found him dead." "We always thought mother would live at least twenty years more, but she went to bed Monday and never got up." "He was a great big strapping fellow; looked to be in first-class shape; but he died suddenly at the age of 32." "Jim laughed at us when we told him to take care of his cold. He passed away just a week later."

No man or woman is too healthy to think about or ignore these astonishing facts!

By M. J. BEATTY

EVERY year more than ten thousand people die of bronchitis, sixty-four thousand die of pneumonia, seventy-five thousand die of kidney trouble, fifty thousand die of respiratory disease, one hundred and six thousand die of tuberculosis, approximately eighty-five thousand die of influenza, and more than ten thousand die of intestinal trouble.

What is the reason? All these diseases are preventable. They can be avoided. They need never have happened. *But every year eight hundred thousand people die of these and other preventable diseases!*

The trouble is that most people are so afraid of death—even of the thought of death—that they refuse to face the facts. They hide their heads, ostrich-like, whenever someone tries to tell them something about it. They don't want to be told that Death is always chasing us, hounding us, watching for one little slip that will enable him to snatch us in his cold, clammy grip.

Insurance experts tell us that 50 persons out of every hundred die before they reach 65. Every day we hear and read about men and women dying in their twenties, thirties and forties. Thousands upon thousands die before they have reached the time when they should *begin* to know and enjoy the full meaning of life. The years of preparation were complete. They saw their hopes, their dreams, their ambitions about to be fulfilled. Then they were struck down by death!

Barring accident or suicide, no one should ever die until he has reached the full span of life—70 years or longer. Scientists have discovered that we ought to live to at least 80 years of age. But it is a fact that

less than one person in ten ever reaches that age. Most of them succumb to *avoidable* diseases long before that time. And the people who are the victims of these diseases *should not die*. They are strong, healthy, robust. They are so confident of their health that they won't take the least precautions against trouble. They leave themselves unguarded. They permit themselves to go too long without attention. They treat their bodies carelessly. And so suddenly are they extinguished that no one can believe it is really true!

Yet Nature is not unfair. She is constantly warning us of impending sickness. Seemingly trivial symptoms tell us of serious troubles taking root in your body. Possibly, like most people, you pay no attention to your "off days." You absolutely forget the danger signals. As long as you can stagger around you fool yourself into thinking that everything is all right, and that you will soon get over your little cold, your little pains, your little headache.

But, when ignored, Nature is merciless. Her age-old law of the Survival of the Fittest goes on steadily. She knows no excuses—she accepts no apologies. If you don't keep yourself fit, if you don't watch and *heed* the danger warnings, if you don't learn how to get rid of your incipient troubles—Nature will wipe you out as unfit to survive.

The Average Person Pays Thousands of Dollars in Doctor's Bills

Those who do not know Nature's methods of preventing and curing sickness are ill an average of 21½ days each year. In fact, it is estimated that

the average person in a lifetime spends \$4,100 on doctor and hospital bills, loss of time from business, medicine and other expenses due to illness. Thousands of people are living half-powered lives because they are ignorant of the laws of Nature. It would be foolish for you to run to the doctor every time you felt a little pain. Yet even the most unimportant symptom may indicate some grave danger. What are you to do then? Just "let it go"? No! A thousand times, No! For these "little" things are what grow into big diseases.

For the first time, you can discover at a glance exactly what your symptoms mean. You will know how to identify in its earliest stages any sickness or disease. You will know how to stop the progress of these ailments, how to eradicate them. You will learn how to enjoy superb health, almost complete freedom from sickness, pain, worry and suffering. You will find all this valuable knowledge in the wonderful work prepared by the Father of Physical Culture—Bernarr Macfadden.

The Encyclopedia of Physical Culture

(New 6th Edition Just Off the Press)

This marvelous five-volume work gives you the information you need to build up rugged strength, health and vitality. It is for every member of the family—it covers every phase of strength and body building for adults, children and babies.

It gives valuable information on how to

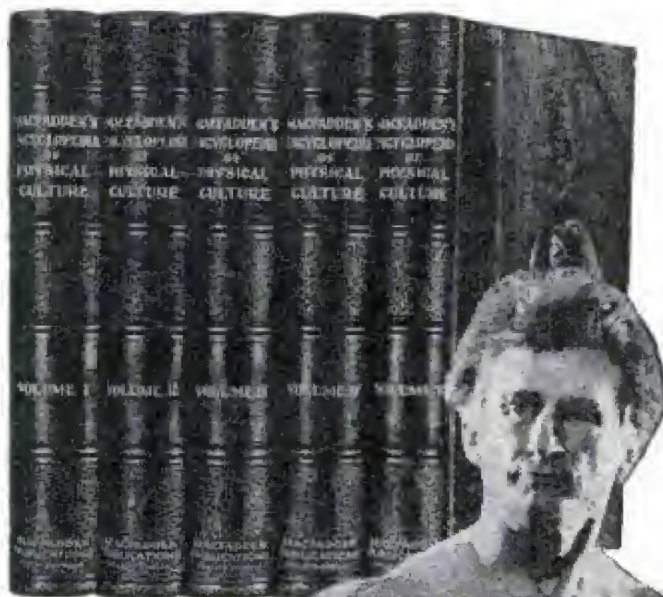
possess exhilarating health every day in the year
eat for health
build a powerful physique
avoid unhappy marriages
fast as a curative measure
apply all methods of drugless healing
give first aid in emergencies
recognize diseases by manifestations
treat the common forms of disease
benefit by laws of sex and marriage
treat diseases of women
have healthy and vigorous children
treat male disorders
care for the complexion
know your own body
diet for the cure of disease
know the art of food preparation
correct physical imperfections
avoid disease
cure by hydropathy (heal by the use of water)
apply home treatment for disease
build nervous energy
understand the process of reproduction
diagnose diseases
treat female disorders
obtain virility and manhood
care for the hair and feet

and hundreds of further valuable health facts.

A thorough and extensive treatment is given of the laws of sex, the attainment of virile manhood and womanhood, and happy, successful parenthood, together with details for diagnosis. Handsomely illustrated charts on anatomy and physiology appear throughout the book.

It is neither dull nor technical but is simple, comprehensive and complete in every sense. It is the crowning effort of Bernarr Macfadden's rich, full experience in the science of health and physical culture. He has had more than thirty years' experience in guiding thousands of physical wrecks to glorious health and vigor. Out of that experience he built his Encyclopedia of Physical Culture.

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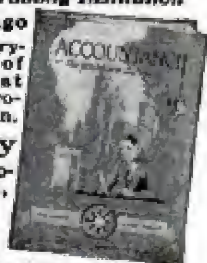
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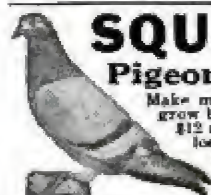
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"Fat, oil, butter, cream and eggs certainly caused my catarrh and deafness, but your diet of lean meats, green vegetables, fruits, etc., restored me in a few weeks. My brain power and complexion improved tremendously, and I succeeded financially." *Educational Booklet 10a, BRINKLER SCHOOL OF EATING, Dept. 42, 131 West 72nd St., New York.*



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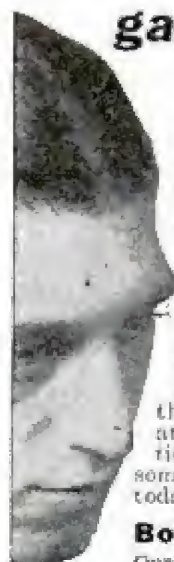
Make money breeding squabs. Sold by millions. Start small, grow big. Start now. Read how our customers sell squabs for \$12 a dozen. We have been established for 26 years. Better look into this. Let us send now, at no cost to you, our big, illustrated free book telling how to make money breeding squabs. We sell Racing Homers also. Write
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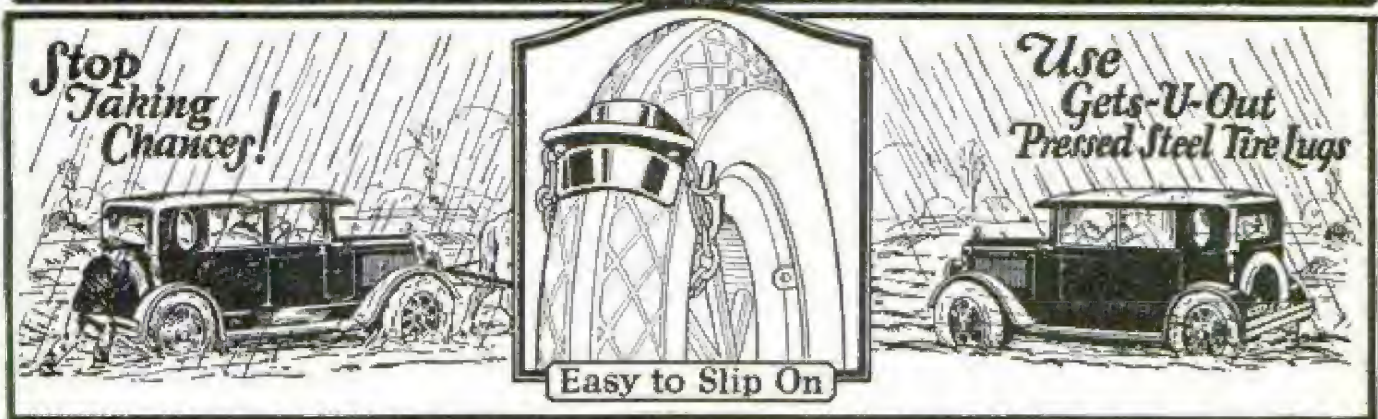
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Amazing New Invention JUST OUT (Patented) Nothing Like It

**Two On Each Rear Wheel Forces Cars
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Whenever you attempt to drive your car or truck through deep mud, sand or snow—the chances are ten to one you're going to get stuck. And you'll probably end up by paying \$5 or \$10 towing charges.

Ever since I got stuck in mud up to the axles three times in making a cross country trip about a year ago, I have been experimenting in the perfection of a device which could be quickly locked on the rear wheels to afford traction sufficiently powerful to force any car or truck out of mud, sand or snow.

And now—you need no longer worry about getting stalled in mud, sand or snow—not with a Set of 4 of my Gets-U-Out Pressed Steel Tire Lugs in the tool box. In a jiffy you slip 2 on each rear wheel—and out you go—even if you're buried up to the axles.

My Lugs positively afford the only dependable relief obtainable from getting stalled—avoids loss of time, towing charges and furnishes safe traction up or down steep, muddy or sandy hills.

On the market only 30 days yet hundreds of car owners are already using my Lugs successfully. Sturdily constructed of steel, rust proof and with nothing to get out of order, they will last for years.

Your car deserves a Set.

Art J. Benson, Gen'l. Mgr.

CHICAGO TIRE LUG COMPANY, INC.

149-338 W. 47th Street

Chicago, Illinois

"Gives A Gripping Power Not Secured By Tire Chains"

A New Year Around Seller

Earn \$10 to \$60 a Day

Over 20,000,000 car owners are waiting for my amazing device. *Positively nothing like it*. One minute demonstration gets the order. Every car and truck owner buys. Your field is unlimited. Sells at a low price under a money-back guarantee—with over 100% profit. I don't care if you've never sold before, you'll positive y coin money—full or spare time—with this much needed accessory. And it isn't necessary for you to invest your bank roll either. You've been looking for an opportunity to make big money. Here it is.

Test My Lugs at MY Risk

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Gigantic advertising campaign just starting. Clip and mail the OPPORTUNITY COUPON—NOW and test my Lugs at my risk. Increase your weekly earnings in your spare time or get into business for yourself full time on this whirlwind money maker.

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I hereby agree to refund the full purchase price if my Lugs fail to force any car or truck out of mud, sand or snow.

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Just think of it—\$60 in one day—and the first day out with this new, live seller needed by every car and truck owner—that's the record hung up by G. H. McLeod of New York.

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"I made \$21 in 6 hours with your Gets-U-Out Pressed Steel Tire Lugs. They are a positive success."

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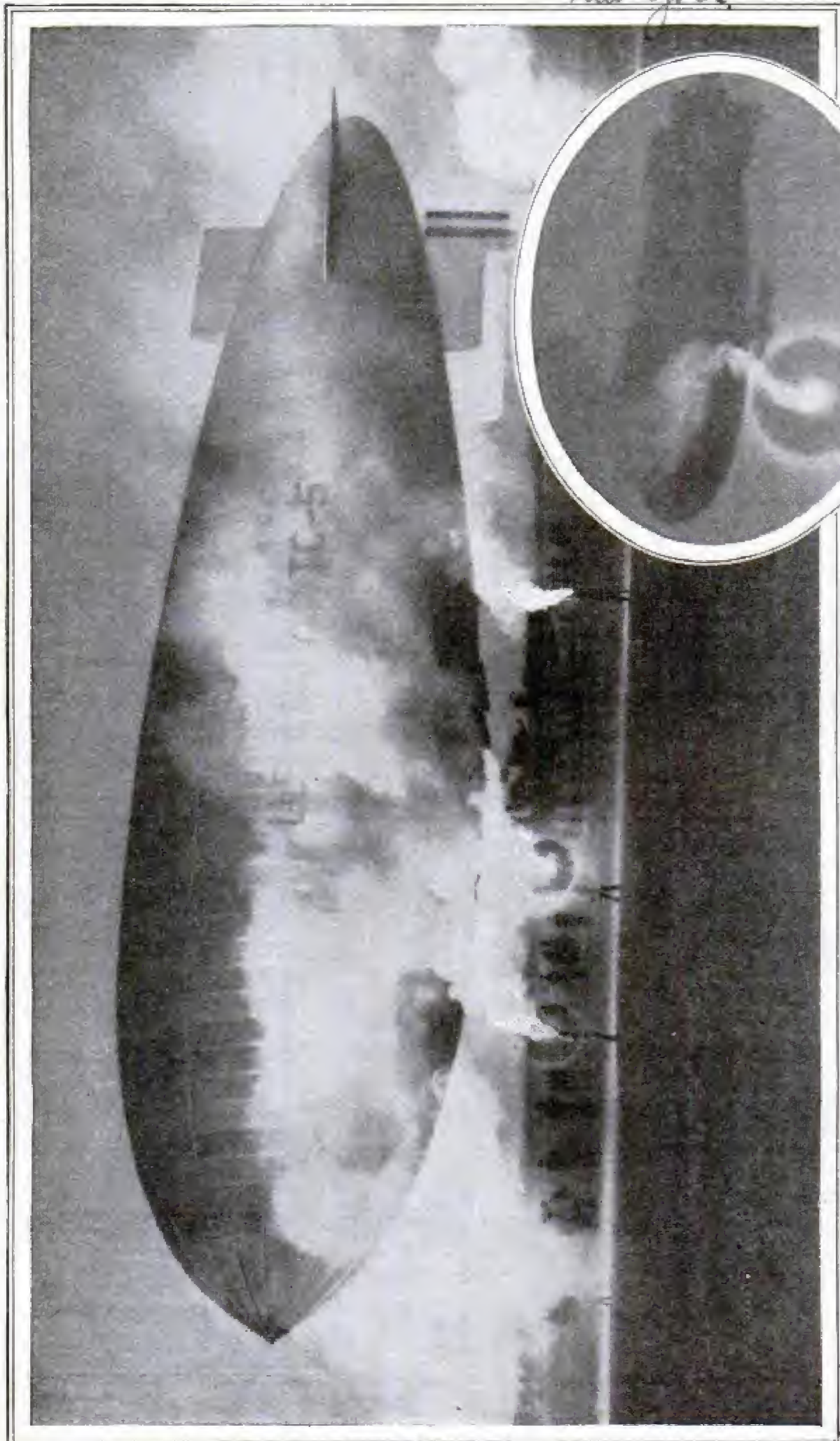
I want to get my share of the big money to be made with your new Gets-U-Out Pressed Steel Tire Lugs. Send me the facts without obligation about my profit and your territory plan.

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Popular Mechanics Magazine

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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 45

JUNE, 1926

No. 6



Airplanes Competed with Dog Teams in the First Rush to Reach the New Gold Field at Red Lake and Stake a Claim Before All of the Best Ground Was Taken Up by Early Comers

Planes Race Dog Teams in New Gold Rush

Wildest Stampede since Klondike Days Follows Reported Discovery of Rich Mines in Wilds of Northern Ontario 1605.

WITH airplanes roaring overhead and dog teams mushing across frozen lakes below, the wildest gold stampede since the Klondike days has drawn hundreds of adventurous prospectors into the wilds of northern Ontario.

Spurred by reports of a rich strike on Red Lake, 130 miles northwest of Hudson, the nearest railroad station, adventurers from all parts of Canada and the United States, reinforced by geologists and agents of several big mining companies, flocked to the scene.

The trail led across frozen lakes and rivers through a virgin wilderness inhabited only by an occasional white or Indian trapper, a journey of six or seven days with the best of dog teams and under favorable weather conditions—and the latter were rare. Temperatures of seventy below zero, blizzards sweeping across the lakes, and snow many feet deep caused unusual hardship.

Despite the handicaps, 700 claims were recorded within a space of two weeks, and as many more were staked and waiting, while the real rush had hardly begun.

Three thousand acres were recorded in the first stampede, but, hampered by the deep snow, no one was able to learn the exact extent of the gold-bearing bed, so claims were staked everywhere along the lake shore in hope that the vein would be found underneath when the snow melts in the spring.

The rush will go down in history as the first gold stampede in which airplanes were used. Two ships ferried miners, newspapermen and photographers to the scene—and both met with disaster on their first flight when they attempted to land in a blinding snowstorm. Seven feet of snow overlying a foot and a half of slush on the ice-covered lake saved the passengers from injury, but one plane was wrecked beyond immediate repair, and the other required three days' work before it was able to fly out, with a broken propeller. The two airplanes started from the railroad base at Hudson, Ont., in company, and all went well until they were a few miles from the Red Lake camp, when they ran into a terrific blizzard. The snow shut off vision, and after circling

Canadian National R.R.
Publicity Bureau, Ben Leason 505

Flight Age
New York

aimlessly over the spot where they believed the camp to be, the pilots finally decided to chance a landing, with the resulting crash.

The cold was so intense that during the repair work the planes would be chopped free of the ice each morning, only to freeze up again at night. The anti-freeze solution in the radiators, drawn off during the work, froze solid in cans and had to be melted before it could be restored.

When the first ship was repaired sufficiently to return for spare parts for the other, the crews built a fire on the lake shore, heated rocks, and piled them around the carburetor until they had heated the gasoline enough to vaporize.

Despite their accident, those who went in by plane fared better than the hundreds who mushed in on foot. Dog teams were at a premium, and many who had the price were unable to buy them. Sleds were pulled in by hand, some tramped in with packs on their back, and others tried horses hitched to toboggans and sleighs.

Food supplies were short and prices rivaled those at Nome in the early days of the Yukon.

One of the first arrivals on the scene was a Northwest Mounted Police officer, who established the law at the new mining camp. With him on the trip in went Paul Reading, a reporter for the Toronto "Star," who brought the camp to the outside world through dispatches sent by every returning dog team. Writing of his trip, Reading said:

"Our first stopping place was Lac Seul factory, the Hudson Bay post on Lac Seul, twenty miles from Hudson. There we met Lorne Howey, discoverer of the first claim, who was on his way out. He hove into view down the trail, clad like an Eskimo in parka and moccasins. That night, by the glow of the red-hot beehive stove

in Joe Kenneally's stopping house, while outside the score of huskies chained to trees made the darkness ghostly with their eerie cries, Howey told us of the new field and the discoveries to date. Gold is showing, he said, over a stretch of five miles in length.

"A road is being cut to Lac Seul to bring in the drilling machinery before the spring break-up of the ice. It also will relieve the food shortage. Dog food, except for occasional fresh fish caught through the ice, is almost unobtainable. It costs sixty cents a pound to freight supplies in from Hudson by dog team. Flour is selling at \$14 a hundred, sugar from \$25 to \$35, beans \$20, bacon \$1.25 a pound, butter \$1.50, tea \$1.25, and other things in proportion."

From Red Lake, Reading wrote of walking through the trenches dug down to the quartz vein and hacking off samples so peppered with gold that it was visible to the eye. A mile away on one side was a similar trench, and another was as much as four miles away in the opposite direction.

"To the little poplar trees that stud the shore," he wrote, "a legion of dogs are chained, prick-eared huskies, collie curs, nondescript mongrels of intricate ancestry, fish eaters, self-scratchers, the uncivilized and unrequited slaves of a harsh regime. They fill the air with a doleful sound, the collies yelping shrilly, the huskies, unable to bark, rousing the echoes with that wailing ululation that resembles the cry of neither dog nor wolf, but is the song of the wolf-dog alone.

"But through this chorus of mourning rings another song, almost as incessant and of supreme significance, the unmistakable tapping of steel upon rock. It explains this whole northland spectacle, for it is the noise of the samplers, patiently



The Gasoline Husky. Replacing Several Teams and Hauling a Long Train of Heavily Loaded Sledges, Promises to Revolutionize Travel over the Deep Snows of the Frozen North



Assembling a Pair of Airplanes at Hudson, the Jumping-Off Place for the 130-Mile Dash to the New Red Lake Gold Field; Both Planes Were Damaged on Their First Trip When They Became Lost in a Blizzard in Fifty-below-Zero Weather; at Right Is a Map Showing the Location of Red Lake and Hudson in Relation to the Minnesota Boundary and Lake Superior; Below, Prospectors Are Roping Supplies to Their Dog Sleds, While Near-By Rests One of the Snow Motors Used to Haul Long Sled Trains



chipping channels across the wide band of quartz where Lorne Howey last summer struck gold.

"The chips, as they fly, are carefully collected, religiously sequestered in small canvas bags and labeled for the assayer.

"Mining history is being written and these are the characters that record it."

Many of the first prospectors on the ground sold their claims without ever having put a pick into the ground. Groups of ten claims brought as high as \$40,000, the buyer gambling on the chance that one out of ten might develop a mine. Most

of the winter buying and selling was pure speculation, since the extent of the formation could not be learned accurately until the snow was off the ground.

On those claims where work was actually started the vein was reported to be one of the finest ever found in Canada, promising an unusually rich camp when its full extent is opened. The fate that dogs gold prospectors was again demonstrated when, among the later arrivals were several prospectors who had covered the territory ten years or more ago without striking the pay dirt.

Snow tractors probably Snow Motors Co. 620 E. Hancock Detroit Mich

60² AERIAL TRAMWAY TO SCALE MT. WHITNEY

Mt. Whitney's crest, 14,501 feet above sea level, the loftiest peak in continental United States, will soon be accessible without climbing. An aerial tramway of cables stretched from crag to crag will support electrically propelled cars to haul passengers up and down the mountain in a fraction of the time required for the foot journey and without the attendant risks.

The project, which will open a new world to the traveler and the scientist alike, is expected to cost \$350,000, and engineers declare that it should be finished by late autumn. A federal permit has been granted, and orders for the 1,100 tons of steel required have been prepared. The

tram, although reaching nearly two-thirds of a mile higher, is similar to that which has been operating safely and successfully in the Chamonix valley, France, to the top of the Aiguille du Midi, one of the steep needles of the Mont Blanc chain. There,

two cables are supported by steel pylons or towers set where the contour necessitates, and the cars, of steel and aluminum with a capacity of twenty persons each, go up and down alternately, counterbalancing in part and passing each other midway. The Mt. Whitney skyway will require sixty-three supporting towers, engineers calculate, from forty to ninety feet high and placed twenty to 2,000 feet apart, together with two immense tension pylons. The cables alone will weigh 315 tons. Power will be furnished from one of the Los Angeles stations.

The journey from the base station to the top will be made in about an hour and fifteen minutes, it is expected. At times, passengers will look down from the cars on lakes and valley bottoms nearly a mile below them. At the crest of the peak, a forty-room concrete hotel with a cupola for observation purposes will be erected. From this "roof of the United States" and its chilly atmosphere, the traveler can see one of the hottest spots in the world, Death Valley, 100 miles away. Thirty other peaks, each more than 14,000 feet high and many more of altitudes in excess of 12,000 feet, will be visible from the hotel. A downward glance on the east side of the peak will reveal a shining lake at



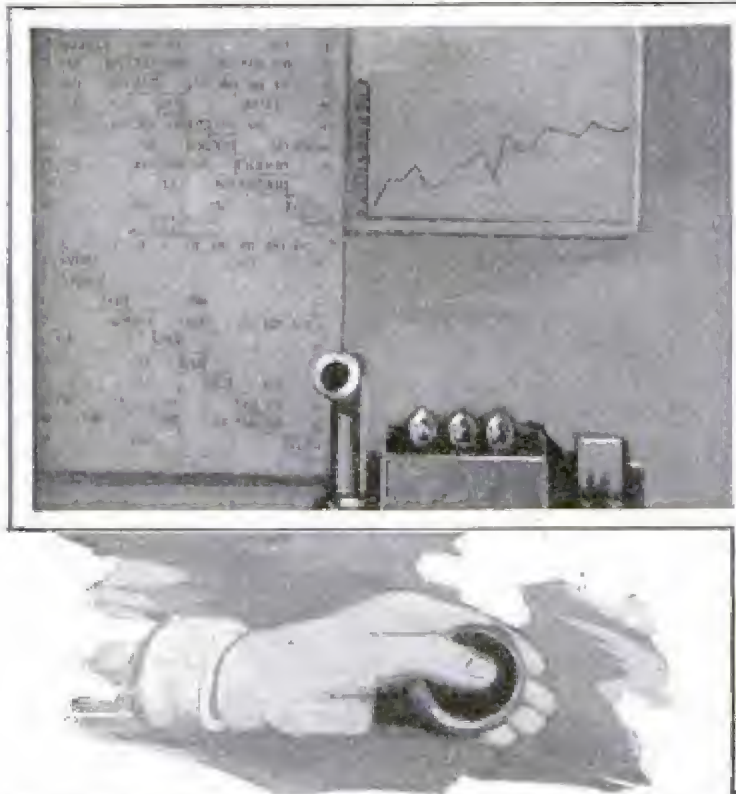
the foot of a sheer cliff, 3,800 feet high. Mt. Whitney was first climbed in 1873, and since then, has been the scene of numerous adventures and scientific achievements. It was here that Dr. W. W. Campbell, president of the University of California, obtained data as to the amount of water vapor and oxygen in the atmosphere of Mars, and last fall Dr. Robert Millikan climbed it to further investigate the so-called "cosmic ray."

TEACHING DEAF TO HEAR THROUGH THEIR FINGERS

Prof. By ROBERT H. GAULT, *Hotel Roosevelt*
 (Northwestern University, on Leave with the National Research Council) *Washington D.C.*

HOW sensitive is the skin? How fine differences can be distinguished by touch? These are questions for the psychologist. The experienced silk salesman,

their feel upon the skin of a practiced subject. The touch also may be em-



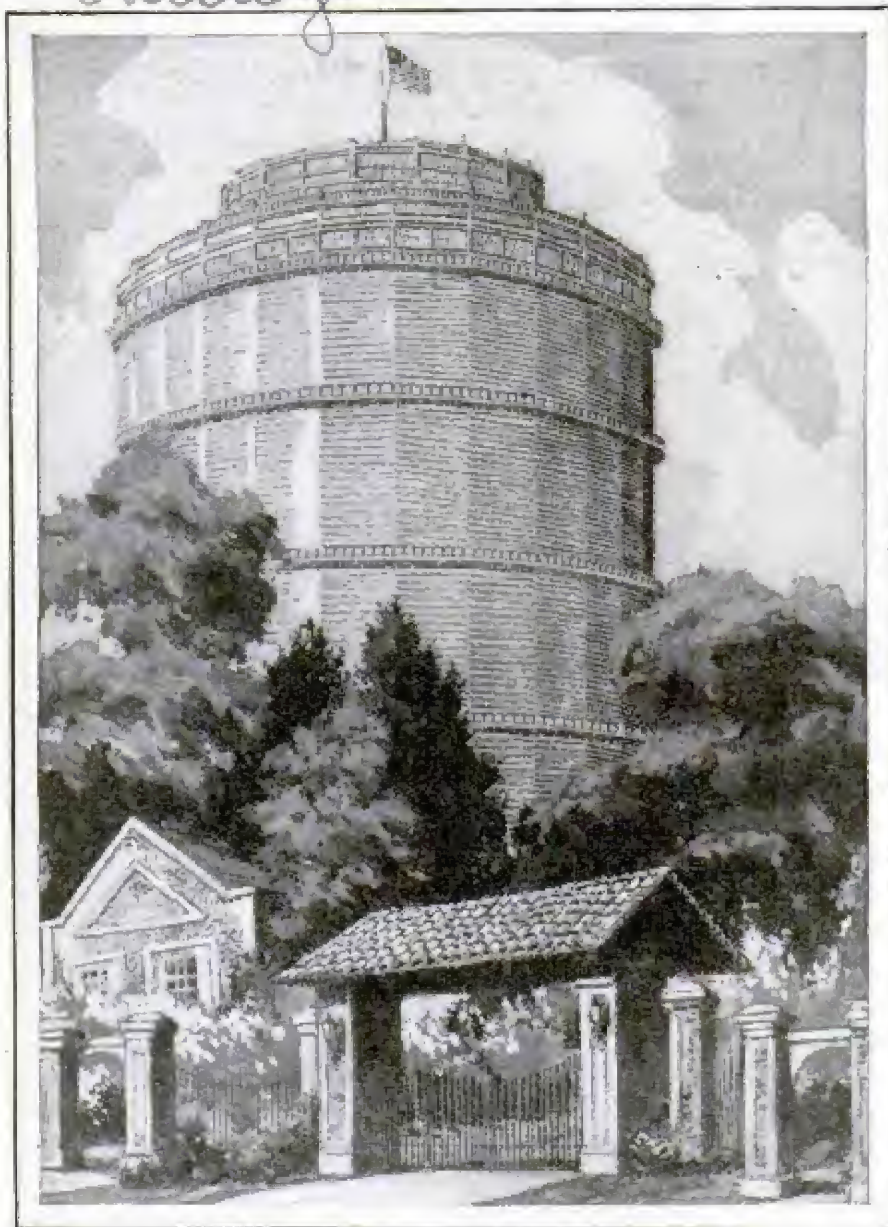
Learning Curve and Charts; Receiver in Hand of Deaf as "Listener," and Soundproof Bag in Which Subject Grasps Receiver While Undergoing Vibration-Interpretation Tests

blindfolded, once he has passed his fingers over a piece of silk, can tell more about the goods than the layman ever knew. Place your fingers upon a solid chair when a heavy-voiced person, sitting in it, is reading aloud. You can feel the chair vibrating with the reader's voice. These observations mean that the skin is more sensitive than we have supposed and suggest the possibility of transmitting the vibrations of speech to the skin of the deaf in such a way that they may learn to distinguish the elements of which words are composed and discriminate words and sentences as wholes. In nearly four years of work I have demonstrated that the possibility is a reality. Deaf subjects in my laboratory, who cannot understand speech even by aid of an acousticon, have made startling developments in the direction of understanding it by way of its feel upon the skin. Literally scores of words and elements that cannot be distinguished by observing the mouth and face of a speaker, can very easily be discriminated by

played to aid the deaf to control their own vocal expression. The deaf lose the use of the voice (or never acquire it) because they cannot hear their own voices or those of others. They cannot correct their speech, such as it is, as hearing people do. But I can enable them to feel their own voices upon their finger tips and to compare it with the feel of my voice, each of us in succession uttering the same word.

Suppose you were teaching a group of deaf people to understand your speech and the speech of others by means of "reading the lips" visually. So many things about speech cannot be seen. Very much that is hidden from view can be felt by means of suitable instrumental aids. The rhythm, accent, emphasis and tempo of spoken discourse that are all but lost to the lip reader can be distinctly felt upon the hand. Add the feel of speech to its usual appearance upon the lips and face and the accuracy of interpretation mounts by from forty to more than one hundred per cent in some cases.

Chicago.



Artist's Drawing of Ornamental Gas Tank in Park Setting; Pleasing Color Scheme Will Be Followed for Exterior

GAS TANK IS MADE BEAUTIFUL AND SET IN PARK

Beauty and gas tanks generally are not associated, but a huge steel container being constructed in Chicago will have a pleasing and striking appearance, if plans of its designers are successful. They propose to color the tank in such a way that it will harmonize with its surroundings and be less conspicuous against the horizon. It is to be given an attractive setting with shrubs, trees and flowers planted in a small park plot at the base.

GRIND OLD LEATHER INTO PULP TO USE IT AGAIN

Old leather and other substances are converted into strong and useful material, costing about one-half as much as hides, by a process a young Scottish chemist has

developed. According to reports, he first grinds the leather into a fine powder, removes the impurities and adds a small quantity of binding material which turns the substance into a tough dough. This is colored, milled until it is uniformly mixed and then pressed upon a strong cloth.

WATER SOFTENER FOR HOMES IS AUTOMATIC

Connected to the city water-supply system in the home, an automatic softener now on the market consists of two tanks, one containing a chemical and other ordinary salt. Water flows into the bottom of the chemical receptacle and as it passes through a meter, valves are operated in such a way that the water is permitted to flow on when the softening capacity of the chemical has been reached. At the same time, a brine solution from the salt tank is forced through the chemical, reconditioning it. All the attention needed is to keep the salt tank replenished. The system

affords the household a constant supply of soft water, saving soap, lightening work and preventing skin troubles that sometimes result from the use of hard water.

EARTH CRUST GROWING HOTTER ENGLISH PROFESSOR SAYS

In some 30,000,000 or 50,000,000 years, the earth's crust will liquefy completely, in the opinion of Prof. John Joly, of the university of Dublin. This will be the result of the constantly increasing temperature of the strata, the professor believes, due to the interior heat of the earth. The lower layers will gradually cool again and the continents again rise up, he predicts. It is his belief that this process has already repeated itself many times in the past and will do so periodically also in times to come.

Rayton, Ohio.

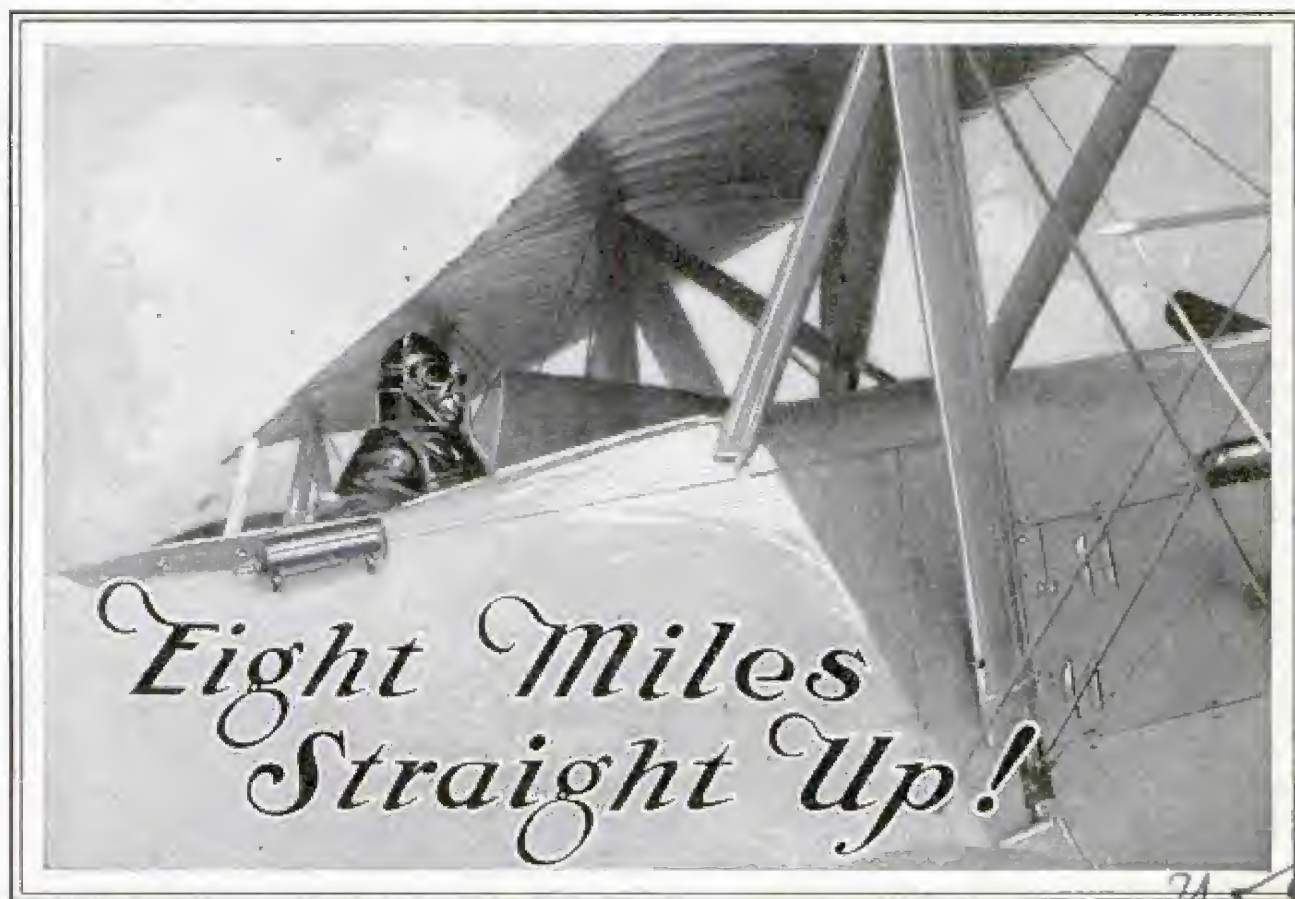
Auto Pump & Supply Co.

1345

no data.

1685

Int. Bits 3/20/26



Lieut. John A. MacReady Just Before He Started His Last Attempt to Break the World's Altitude Record by Flying Eight Miles High; Note the Oxygen Tube in His Mouth

By LIEUT. JOHN A. MACREADY, U. S. A. S.

(as told to J. Earle Miller)

HOW would it feel to be eight miles up in the air, where the atmosphere is so rare that a man could not live in it, and then find your supply of bottled oxygen is giving out?

Lieut. John A. MacReady, U. S. A. S., who recently set a new American altitude record of 38,704 feet, and followed with a flight to 37,576 feet in an effort to recapture the world's record, had that experience, and, because he carried an emergency flask of oxygen, lived to tell it. But let Lieut. MacReady tell the story:

"I had reached the plane's 'ceiling,' the highest point to which it could climb without more power, and was making the observations I had gone up to get, when suddenly I began to feel myself slipping into unconsciousness. I touched my tongue to the tip of the oxygen tube between my teeth, and found no oxygen coming out—the supply was exhausted.

"The emergency supply was in a steel flask, compressed under 1,600 pounds' pressure. I needed at least 1,000 pounds of that to get to a safe level. That left 600 pounds to go on while I continued my work. I wanted to stay up as long as possible, and with one eye on the oxygen-

pressure gauge I kept on. When the needle touched 1,000 pounds, there was nothing to do but quit and start back to earth.

"The sensation of running out of oxygen is almost indescribable. I had experimented with it before by removing the tube for a few seconds. The result is like turning off an electric light at night. The bright blue of the sky turns a dirty gray, growing rapidly blacker as you begin to slip. Within fifteen seconds there are black spots before your eyes. Another fifteen, and you are growing weak. Slip the tube back in your mouth and—snap, the sky brightens up, your strength comes back and the spots disappear.

"Even with oxygen, life is at a low ebb in that rarefied air and intense cold. My thermometer registered minus fifty-nine, Centigrade (between 75 and 76 below zero, Fahrenheit) this last trip. The brain becomes numb, you can't think rapidly, and every movement is correspondingly slow. I look at an instrument and say to myself, 'Now, I wonder what that is.' I spell out the name, letter by letter, and then sit and wonder what the word means. It may be minutes before the letters and their mean-

ing dawn on me. On the high flights, the pilot has much to do. The altitude record, while it gets the attention of the world, is only an incident. We don't go up there to set altitude records, but to observe the performance of engines, superchargers, propellers, wing designs and other things. Dozens of flights are made to high altitudes for every one in which we set a record. The information collected on the way is digested and studied, changes made in design of the ship or equipment, and finally we try out the changes by going up to the ship's ceiling, to find, perhaps, that we have made a new world's mark.

"The pilot, though, is busy studying his instruments and carrying out his observations. There isn't much time to look around. The first time I made a high flight I was amazed to find clouds up in that intense cold, where moisture could not exist in any form but ice. The clouds, the weather bureau later advised me, were formed by tiny ice particles. I often look over the side, see them, and think, 'Now that's queer,' but they don't make much more impression on a sluggish brain. Those little ice clouds resemble nothing so much as

sibly was the edge of Lake Erie. The sensations of living on bottled oxygen are the outstanding memories of a high-altitude flight. The air is so light up there that, if you open your mouth, the saliva bubbles and boils away. You can't suck a tooth with the tip of your tongue, it's just a physical impossibility.

"One fortunate thing is that there is no trouble about vaporizing your gasoline—the trouble is the other way around. With pounds of air pressure removed from its surface, the gas bubbles and boils in the tank. The air pressure is so light that we can't use a suction pump to draw the fuel a few inches to the top of the tank. Instead we have a force pump in the bottom to push the gas up into the lines.

"Pre-ignition is the chief trouble with fuel, and we get around that by using California gasoline, which has inherent properties which prevent pre-igniting. No particular brand, any gas from California wells will do. For oil I used a medium grade, considerably lighter than that used for automobiles in the hot summer. To reach the ceiling of a plane, the motor must run at full speed and develop every possible ounce of power, but the oil used stands the high en-



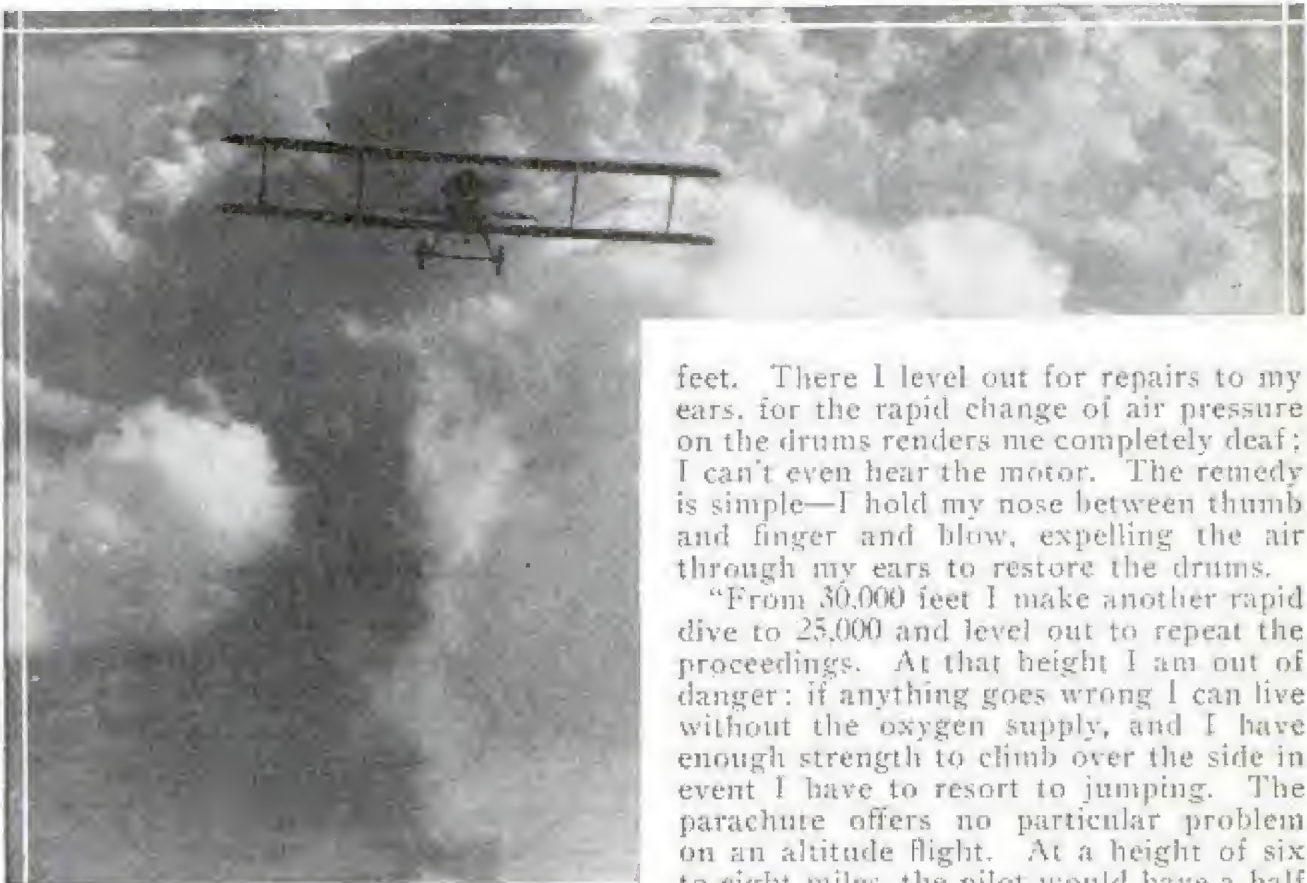
Lieut. MacReady and His Recording Instruments, Including Four Barographs; in Front of His Right Arm Is an Open One, Showing the Smoked-Paper Cylinder and Recording Arm

the little white-winged cherubim you see floating around the edges of some church pictures.

"This last trip was fairly clear and the visibility quite good. I could see Dayton below, and off to the west, more than a hundred miles away, Indianapolis. To the south was Cincinnati and the Ohio river, winding away for scores of miles, all perfectly clear at that height. To the east I could see Columbus, and in the distance the foothills of the Alleghenies, over beyond Zanesville, while on the north was a low line along the horizon which pos-

sible was the edge of Lake Erie. The sensations of living on bottled oxygen are the outstanding memories of a high-altitude flight. The air is so light up there that, if you open your mouth, the saliva bubbles and boils away. You can't suck a tooth with the tip of your tongue, it's just a physical impossibility.

"I keep pretty well over Dayton during the flights, spiraling up in light winds and facing into the stronger ones. Frequently I find winds blowing better than 100



feet. There I level out for repairs to my ears, for the rapid change of air pressure on the drums renders me completely deaf; I can't even hear the motor. The remedy is simple—I hold my nose between thumb and finger and blow, expelling the air through my ears to restore the drums.

"From 30,000 feet I make another rapid dive to 25,000 and level out to repeat the proceedings. At that height I am out of danger: if anything goes wrong I can live without the oxygen supply, and I have enough strength to climb over the side in event I have to resort to jumping. The parachute offers no particular problem on an altitude flight. At a height of six to eight miles, the pilot would have a half

miles an hour at extreme heights. The velocity is so great at times that the ship will be blown backward when headed full speed into the wind, but, as it is climbing all that time regardless of the wind, it does not matter particularly, except that if blown too far I will have a longer trip back to the field. It took an hour and a half to climb to the ship's ceiling this last trip, and three quarters of an hour to come down. The four barographs carried in the rear cockpit record not only the climb but the time taken. Each has a smoked paper on a cylinder revolved by clockwork, and a recording needle traces the altitude on the carbon. Two of the barographs are opened here at once and the climb calibrated, while the other two, which were sealed before the start, are shipped, unopened, to the bureau of standards for the official calibration on which the world's record is based.

"After I get through with my work I start down at once, as fast as the ship can be driven, until I have descended to 30,000



How Dayton Looks from a Height of More Than Five Miles, a Picture Taken from Lieut. MacReady's Plane by Captain Stevens at a Height of 32,000 Feet, Making a World's Record

hour or so to make up his mind in the event of any ordinary breakdown, and it is just as easy to make a high jump as a low one, safer in fact. I piloted Capt. Stevens when he made his world's record jump from 28,000 feet. It took him twenty-five minutes to reach the earth, and he drifted twenty-five miles in that time, or a mile a minute.

"Of all the sensations you experience, restoring your eardrums after a rapid drop is probably the worst. It feels like you were blowing your head inside out. The difference between ground and high-altitude air pressures is enormous. With a ground pressure of 14.7 pounds, at 35,000 feet you only have 2.5 pounds. The slowing up of your senses, even under oxygen, is the worst danger. You can't possibly think fast if an emergency arises, but then you have plenty of time to think even if you are falling. The last 2,000 feet of climbing before you reach the ship's ceiling are always the worst, and take longer than all the rest of the trip. At the start the high-powered ship, with enormous lifting capacity, rises rapidly. But as you near the point where ship and air are in equilibrium, the power of one just offsetting the density of the other, the climb becomes harder and harder.

"Speaking of the slowness of the faculties at high altitudes recalls a queer experience I had on one occasion when flying with a bakelite propeller. At 28,000 feet the motor sud-

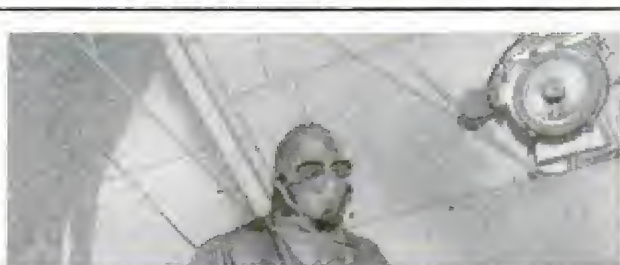
denly gave a terrific shriek and then died. I heard the shriek and knew the engine had stopped, but didn't know what had happened. There was nothing to do but glide back to earth, and when I landed I discovered I had lost my propeller, but how or why was a mystery.

"It developed later that a farmer working in his backyard garden heard the shriek of the dying motor, though before that he could not hear the ship because of its height. He looked up and around, but didn't see anything, so went back to work. A few seconds later he heard a peculiar high-pitched fluttering sound above, rapidly increasing in volume, followed by a terrific thump in a near-by field; but failing to see anything, he forgot about it until he read in next morning's paper of my accident.

"Putting two and two together he went out in the field and dug up half the prop, which was buried in the ground. We never found the other half. The bakelite had broken in two at the hub. Nowadays we use metal propellers exclusively for altitude work.

"I was lucky that the break came where it did and threw the parts clear of the ship. Had a tip broken off, the threshing of the rest would have torn the motor to pieces and might have lopped off a wing or sent

a piece back to hit me in the head. As long as a flyer is conscious and at sufficient height to use the parachute, there is no particular danger."



Above Is Lieut. MacReady beside His Plane, Showing the Supercharger Intake; the Left-Hand Picture Shows the Oxygen Apparatus, with Barometers Suspended on Straps, and at the Right Are the Controls

STUDY CHARACTER BY SOUND FROM BUMPS ON HEAD



Courtesy The Sphere

Placing Point of Electrode to Different Parts of Subject's Head in Character Analysis. The Contact Produces Sounds of Varying Intensity in Different Areas and Persons

Analysis of the character, gifts and faults of any human being can be accurately made, it is claimed, with an interesting apparatus devised by a Ukrainian physician. The subject holds an electrode while the examiner takes the other, in the form of a handle, and adjusts a pair of microphones over his ears. An electric current is turned on and the handle is touched to about fifty-five predetermined parts of the head. The doctor has found, according to reports, that these points correspond in some way to different qualities and tendencies in human character. The moment the handle touches a spot, the apparatus begins to sound. A scale has been established, from zero to five, so that the strength of the sounds can be determined. By tabulating and analyzing the results a sort of psychological profile of the individual is produced in the form of a diagram.

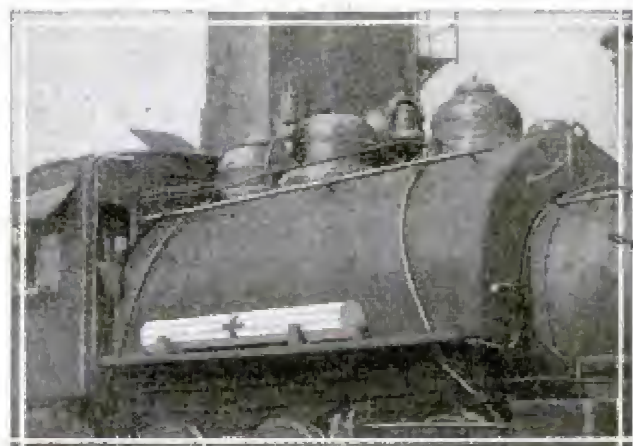
DEFECT IN BIG WARSHIP GUN, FOUND WITH DENTAL WAX

The big guns of our men-of-war, although huge and unwieldy, sometimes develop ailments that require a most painstaking and minute diagnosis to determine the remedy. The linings of these monsters are machined and rifled with great accuracy, and upon the perfection of this rifling depends the correctness of flight of a projectile. Recently, to learn the nature

and extent of the damage to the interior of one of the big guns on a battleship, the dentist was pressed into service. He crawled inside the barrel and made an impression of the defect in dental wax, in much the same manner as he makes an impression of the cavity of a tooth. The result of his examination showed what was needed for the gun.

SAFETY-FIRST KIT ON ENGINE CONTAINS STRETCHER

"Don't make us use this on you," is the warning on the emergency box placed on the running boards of locomotives in the yards of a southern oil company. It contains a stretcher and first-aid outfit.



First-Aid Kit in White Wrapping on Cab of Engine Where It Is Always Ready for Use

*Brook Institute
Berlin, Germany.
Standard Oil Co. La.
Baton Rouge, La.*

Cont. Mr. Verne Jenkins

From White Blackwater. S.C.

GOLF PRACTICE IN STEEL HOOP IMPROVES STROKE

1460.

For the correction of faults and the development of the right swing, head, body



Golf-Stroke Practicer in Use; Hoop Guides Player through Entire Swing and Helps Correct Form

and arm position, and other points in playing golf, a practice hoop has been designed. It is made of nickelplated steel, is nearly five feet in diameter and is supported by two stanchions which can be raised or lowered according to the height of the player. The golfer stands inside the hoop and grasps the club, which works on a swivel and is free to move up and down the hoop. As the stroke is made, the player is aided in performing the necessary movements correctly, such as keeping the head down, the left arm straight, rolling the left forearm and pivoting at the waist. Repeated practice is said to instill the right technique as a habit. The loop can be tilted for flat or upright swings and the club can be adjusted to the difference in reach of various players.

AIRPLANE LANDINGS FOR CITIES TO AID SKY TRAFFIC

1406

Since the airplane has become a factor in commerce, the question of suitable landings within city areas has grown in importance. Interesting solutions of the problem were offered recently in a prize contest sponsored by an eastern architect among students of a New York art school. All were considered of merit, in that they showed ways whereby the planes could land close to other transportation facilities and in the midst of a city, sparing an intermediate haul and consequent delay. One plan called for an immense stage to

be erected on top of four skyscraper towers on a plot about 1,400 feet square. Another included a platform particularly designed for service in connection with steamship piers. It had two levels, the upper one for landing and starting, and the other for repair shops, gasoline-filling stations and waiting rooms. This section also was to be provided with

a cantilever extension for use as a safety cage in the event of a mislanding.

The entire platform was planned to handle 80,000 passengers and 30,000 tons of freight yearly. Elevators would run

from the ship wharves to the top of the airplane landing. A third idea involved an elaboration of the deck over piers with several levels for shops and ramps for automobiles, while another made provisions for anchorages for dirigibles as well as landings for

airplanes and helicopters. The sketch showed a wheel arrangement, each spoke representing a landing, and a spiral runway down the hub for taking the planes to the ground.

PATTERN FOR THEATER AISLES 1668

VISIBLE IN DARK

Black and white tiles on the floors of the aisles of an Ohio theater were laid in such a way that patrons searching for seats in the dark could follow the passage with little difficulty. A combination of a white border with a black field and inner lines of white was found to be the most clearly visible in the dark.



Black and White Design for Theater Aisle That Helps Patrons Find Seats

Vernon Theatre
Columbus, Ohio

Literary Digest
3/20/26



Phone Service Today May Not Always Be Perfect, but Not So Many Years Ago, It Took About Half a Dozen Boys and as Many Minutes to Answer a Single Call

How Chance Played a Leading Role in the Development of Art of Sending the Voice over a Wire

By L. W. KENT

IT was fifty years ago that the first sentence ever sent over the telephone carried faintly about seventy-five feet between Alexander Graham Bell, the inventor, and his assistant, Thomas A. Watson.

And yet over 100,000,000 calls now are sent every day straight to the individual desired, regardless of time, distance or location, the latest achievement being the spanning of the Atlantic by the human voice with the radio telephone.

"It was fifty years ago last June, when, working with Mr. Bell, I happened to snap a little piece of steel clock spring near the end of an electric magnet," Mr. Watson said recently. "It was apparently a trivial action on my part. But the twang of that spring started into motion a set of impulses that, reaching into Bell's teeming brain, hatched a great idea into the speaking telephone.

"I've got it, Watson," cried Bell, "make it for me just like this."

It was in an electrical workshop in Boston that the telephone had its origin. Bell, who was a professor at Boston university, was working on an invention he called a "harmonic telegraph." It was a simple affair, by means of which, utilizing the law of sympathetic vibration, he ex-

pected to send six or eight telegraph messages on a single wire at one time, without interference. On June 2, 1875, accident took a hand in these experiments and started Bell definitely on the trail of an instrument that would transmit the human voice over wires. "On that day," says Mr. Watson, "we were testing out some modification of the instruments. Things were badly out of tune. I had charge of the transmitters as usual, setting them squealing one after the other, while Bell was retuning the receiver springs, pressing them against his ear as he did so.

"One of the transmitter springs stopped vibrating and I plucked it to start it again. It did not start and I kept on plucking it, when suddenly I heard a shout from Bell in the next room, and then he came out with a rush, demanding, 'What did you do?' It was simple. The make-and-break points of the transmitter spring had become welded together, so that when I snapped the spring, the current had remained unbroken, while the strip of magnetized steel, by its vibration over the pole of its magnet, was generating that marvelous conception of Bell's, a current of electricity that varied in intensity precise-



Alexander Graham Bell, Inventor of the Telephone, from a Photograph Taken in 1876, When His First Patent Was Granted

ly as the air varied in density within hearing distance of that spring."

Bell knew that the mechanism that could transmit all the complex vibrations of one sound could do the same for any sound, even that of speech. So that experiment showed him that the intricate apparatus he had thought would be needed to accomplish that long-dreamed-of result was not at all necessary, for here was an extremely simple mechanism, operating in a perfectly obvious way, that could do it. A new apparatus was built and on March 10, 1876, it was tried out.

"I was listening in another room, about seventy-five feet away, says Mr. Watson. 'Suddenly, I heard Bell's voice saying very plainly: 'Watson, please come here, I want you.' That was the first complete sentence ever spoken over a wire. I rushed down the hall to the room where my partner was. I found he had accidentally upset a

battery and spilled the acid all over his trousers."

Bell had filed his application before this experiment, or on February 14, and on March 7 was granted patent No. 174,465 for "an alleged new and useful improvement in telegraphy." Just a few hours after Bell had filed his application, Elisha Gray had filed a caveat also relating to the electrical transmission of speech. A caveat is a statement that the person filing it has thought of an invention, but has not completed or worked it out. As it was decided that Bell had filed his application first, his patent was sustained.

The first conversation on an outdoor line was on a wire, two miles long, between Boston and Cambridge in October, 1877. From that time on romance and adventure have gone into the development of this industry, now operating 6,000 central offices and serving exchange areas connected by 27,000,000 miles of wire. Switchboards have been developed in which there are more than 2,000,000 tiny soldered parts, 15,000 electric signal lights and more than 4,000 miles of wire.

The first telephones to be put into practical use were installed by Watson and Bell in Boston early in 1878. They put up about fifty lines from private houses to downtown offices. Later they developed a central office or exchange. Today there are more than 16,000,000 telephones in use in the United States alone. Bell was twenty-seven years old when he invented the telephone and Watson was twenty-two.

To celebrate the fiftieth anniversary of the granting of the Bell patent, communication was established between New York and London across 3,500 miles of land and sea by wire and radio, conversations being carried on as easily as in an ordinary cross-the-town talk.

The ultimate aim is the complete annihilation of space for the human voice.

Engineers believe that some time man will be able to talk between any two points on the face of the earth. The chief difficulty still faced is interference, said one telephone official, who is particularly interested in the



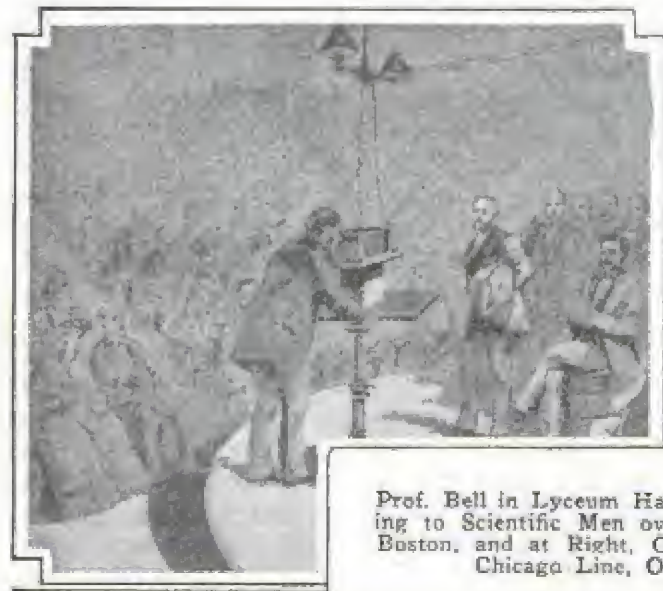
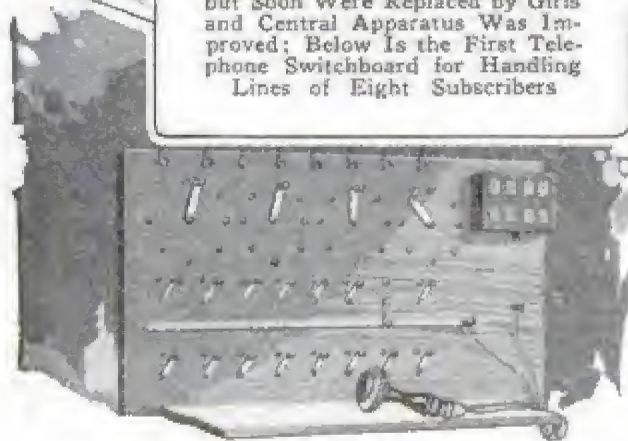
Parent of Our Modern Instruments, the First Telephone Patented by Bell Over Fifty Years Ago



Switchboard of 1882; at First, Boys Were Used as Operators, but Soon Were Replaced by Girls and Central Apparatus Was Improved; Below Is the First Telephone Switchboard for Handling Lines of Eight Subscribers



Thomas A. Watson of Boston in 1874; He Heard the First Communication over a Telephone



Prof. Bell in Lyceum Hall, Salem, Mass., Speaking to Scientific Men over a Wire Stretched to Boston, and at Right, Opening the New York-Chicago Line, October 18, 1892

development of a transatlantic service, although steady progress is being made in eliminating it. A drawback is the present impossibility of conversing by radiophone in secrecy. Others are the facts that at opposite points on the earth business hours do not coincide, and that there are differences in language.

Experiments have not gone far enough to demonstrate what limitation distance imposes nor what the construction of a world-wide relay system would cost.

In the recent transatlantic demonstra-

tion the voice was "stepped up" or amplified 100,000,000,000 times. One hundred kilowatts were used as compared to one-half kilowatt used by the average broadcasting station.

Amplification was accomplished with water-cooled, high-power vacuum tubes, similar to those used in ordinary broadcasting, but much larger. These were over two feet long and radiated so much heat that it was necessary to incase them in four-inch rubber hose, through which a stream of cold water passed.



Glimpses of the Recent Wireless-Telephone Tests between New York and London; Left to Right, Reporters Talking and Listening, Phones with Microphone Mouthpieces, and Operators at Control Board

SIXTY-SEVEN YEARS' BATTLE AGAINST FIRE NEAR END

Burning for sixty-seven years, a fire in the Summit Hill coal mine in Pennsylvania has not yet been extinguished. Engineers estimate that it has consumed 14,000,000 tons of coal, involving an area about one mile long and 1,500 feet wide. More than \$3,000,000 has been expended in fighting it. The blaze was started in much the same way as many fires in the homes of coal consumers originate, from hot coals mixed with ashes. It was common in the days before the Civil war to have large stoves at the bottom of the slopes for the comfort of the miners. The man who tended the stoves was late one morning and, in his haste, shoveled out live coals with the ashes and dumped them into a wooden car which was hauled to one of the unused gangways and forgotten for about two weeks. When repair men were sent to get the car, they found

the coals had started a blaze that had spread to the mine timbers and into piles of loose coal. An open cut was made which isolated the blaze, but instead of burning out, it spread into the coal areas beyond. Next a barrier was attempted by sinking holes six inches in diameter and spaced twenty-five feet in each direction and filling them with fine silt or coal dirt mixed with water, but this failed to check the fire. Finally, a twelve-foot gap was sunk 160 feet into the earth, lined with concrete and the intervening space filled with clay, making a fire wall 700 feet long.

The men had to work in short periods of twenty minutes each because of the intense heat from the fire which spread rapidly and almost gained the barrier before this was finished. The defense halted the fire; but for double security, the west face of the wall was cleared and a water seal constructed. Engineers now believe that the blaze cannot get across this barrier.

Owned by Lehigh Coal and Navigation Co. 1662.



Just before the Crash; Airplane Approaching for Dash through Eiffel-Tower Arch; It Passed Under Safely, but Caught on Antenna Wire, Fell and Burst into Flames

FLIGHT UNDER EIFFEL TOWER WRECKED BY RADIO WIRE

But for the presence of a wireless antenna hung from the top of the Eiffel tower, a French army aviator probably would have been successful in his attempt to fly through the arch at the base of the structure. His plane had passed safely to the other side when a wing struck the wire, sending the craft to the ground, where it burst into flames. The pilot was burned to death. The stunt was done as the result of a wager made with an acquaintance and was considered no more hazardous than many other feats performed with planes. The size of the archway is indicated by the fact that the base of the tower occupies two and one-half acres.

"HOTHOUSES" UNDER SEA WATER PRODUCED BY SUN

Heat absorbed from the sun often warms water to a higher temperature than the air and in quiet pools, natural "hothouses" are formed wherein animal and vegetable life thrives much more abundantly than in places where there is a current. An interesting example of this is

furnished in the so-called oyster pools of Norway, where sheltered basins in the fjords develop comparatively fresh water at the surface with heavier, salty water below. This lower part yields but little of its acquired heat during the night so that it may reach a temperature of 100 degrees Fahrenheit while the surface is less than seventy degrees. The top serves as glass, keeping the warmth in.

METAL CAP FOR PENCIL POINT HELPS DIAL PHONE CALLS



A double purpose is served by a small metal cap with a round knob that fits on either end of the pencil. It is intended to be used in operating the dial on the type of automatic telephone now coming into vogue and may also be slipped over the point of the pencil to keep it from breaking. It fits tightly enough to prevent its falling off.

Sold by Brentano.

1848
American Pencil Co.
220 Fifth Ave. New York

Edwin Tarnes
1111 1/2 Broadway



Using the Electric Brush for Refreshing Effect during Work; Current Is Developed by Hand Lever

ELECTRIC BRUSH FOR MASSAGE GENERATES OWN CURRENT

Batteries, wiring and other attachments are not necessary with a new brush for massage purposes for it generates its own electric current. This is done by means



of a lever which is worked back and forth by the user. The current, being weak, is always harmless, and can be easily adjusted by means of a regulator, and separate fittings are available for hand and foot applications or scalp massages.

NOVEL RESTAURANT LIKE CAMP HAS WHEELS FOR TABLES

439 At comparatively little expense, a California restaurant keeper has designed a novel eating place that combines unique decoration with unusual features in equipment. The interior resembles a stockade of frontier days. The walls are faced with wooden slabs, from which the bark has not been removed, and the background is decorated with murals of mountain peaks. Patrons sit on leather-cushioned kegs at tables with buggy wheels for tops, each accommodating four guests. The hubs are converted into holders for salt and pepper shakers, sugar bowl and napkins, while trays are inserted between knobs on the spokes. These trays are shaped like huge pieces of pie so that they will fit in the sections allotted. The restaurant is conducted on the self-service plan and is further decorated with appropriate signs and relics of western life, such as picks and shovels and other miners' tools. The design of the furniture has been patented.



Interior of Unique Restaurant, and Close View of One of the Tables with Tray Fitted in Space between Spokes

*Pioneer Inn Cor 200 1/2 S. Broadway
Los Angeles, Calif*

With the Fire Fans



Rescue Masks,
Equipped with Oxygen
Tanks, Aid Fire Fighters

By FLOYD TAYLOR

*Keystone View Co.,
91-7 1st Ave
New York*

fighting
FIRE engines roaring through the city streets with their bells clanging and sirens screaming a warning to traffic are an irresistible call to the fire fan.

There are thousands of fire buffs in New York, men who find it impossible to resist the call to follow a fire engine. They range from boys to the Fifth-avenue millionaire who is a deputy chief of the department and has an alarm bell at the side of his pillow.

It is said the name for the enthusiasts who follow the fire engines originated in the days of volunteer fire companies, when there was great rivalry to be first on the scene at a fire. The most ardent volunteers were those who slept in the fire houses on buffalo robes and then came to be known as "fire buffs."

One of the fire buffs in New York is Robert Mainzer, a banker, who is a deputy chief. Another is William F. Kenny, a contractor, who gave the department a specially equipped ambulance which rolls to every important fire in the city. The ambulance was designed by Dr. Harry M. Archer, honorary deputy chief of the department, who rides in the ambulance and is another famous fire fan.

One day Dr. Archer had been on duty ten hours at a fire in First avenue, at

which firemen had been crushed to death by a falling wall, when he was called by the rescue squad to Eldridge street, where two old houses had collapsed in a tangle of timber and brick.

Two laborers were crushed under timbers in the wreckage and could not be saved for hours. Dr. Archer with a hypodermic needle in his pocket, squirmed in among the twisted timbers and reached both men at the peril of losing his own life if the rescue work started another collapse. He kept the two laborers alive with stimulants until they could be taken from the wreckage and both finally recovered. For that job Dr. Archer was given the Bennett medal, the highest award of the fire department.

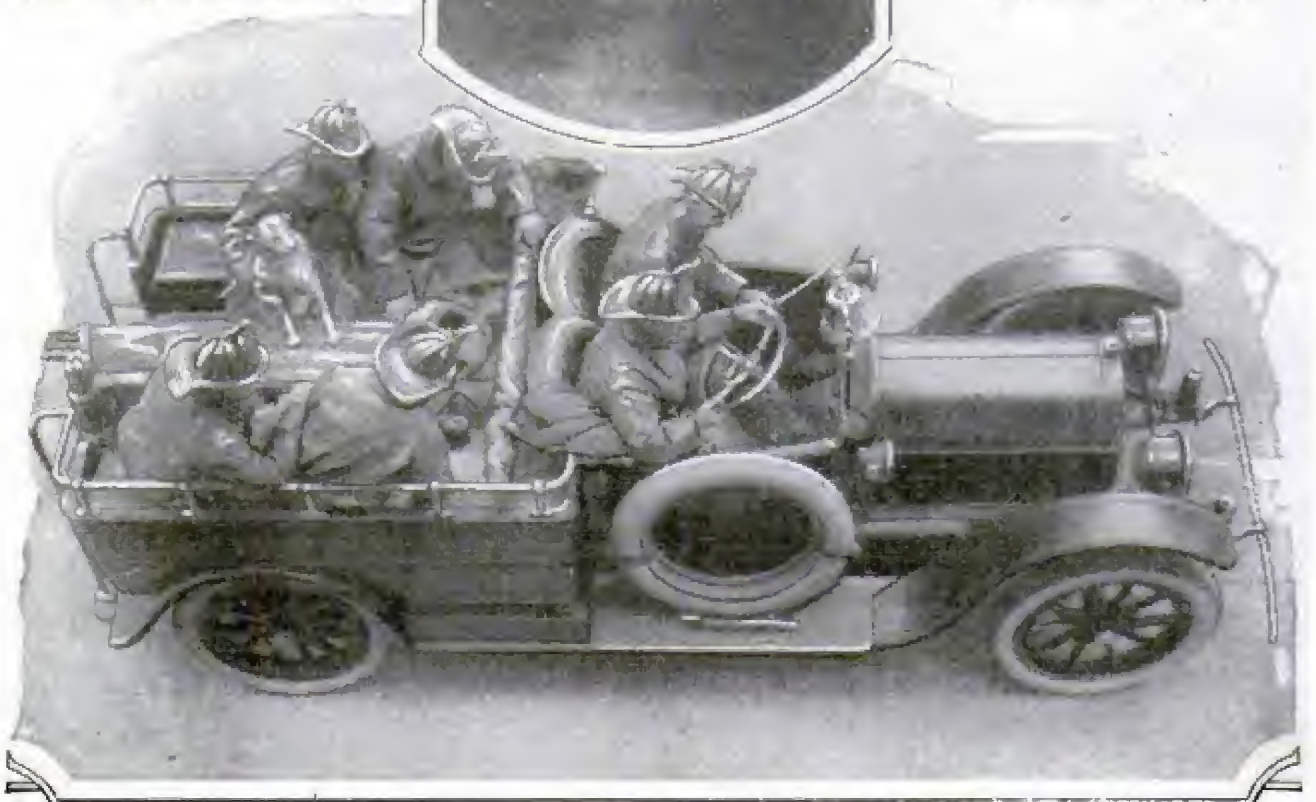
There are fire fans in the small towns who take as seriously the burning of a barn as a New York fan takes a five-alarm fire with three giant water towers throwing water 200 feet up the side of some great building. It was a small-town fan who entered a complaint a year ago against the entire fire department of his town. The department, in man power and apparatus, consisted of one fireman and one fire engine. The fire fan charged that the one-man fire department pulled all the fuses out of the alarm apparatus when



The New York Fire Department Has a Picked Squad of Rescue Workers, Equipped with Gas Masks, Acetylene Torches, Life-Line Guns, Pulmotors and Other Special Apparatus Which Runs to All Large Fires or Any Special Calls; Above Are the Specially Trained Rescuers Leaving Their Recreation Room to Answer Their Call



One of the Rescue Squad Men Sliding down the Pole Bound for the Special Car They Use, Shown Below as It Starts to a Fire; Picked Chauffeurs and the Best and Fastest Cars in the Department Are Assigned for This Work; Note the Stretcher Lying in the Bottom of the Car; on It Stands the Dog Mascot of the Squad





Entering a Building with a Scaling Ladder, Which Is Hooked to the Window Above as the Fireman Climbs



Portable Telephones Carried into the Fire Enable the Operator, Above, to Direct Work; Below, Shooting a Life Line to Rescue a Fire Victim





Rescue Squad Members Answering the Bell. While the Fireman Left on Duty Marks Down the Time on His Wall Chart

he went to bed so that no alarms could be turned in to disturb his slumber, and also that he took the engine for a pleasure trip to New York. There was a debate by the town trustees as to whether the fire department was supposed to function all the time or only when he was in the mood, and finally the one-man department was discharged and another hired.

In the summer the city firemen provide street showers for children of the congested sections. Another service of the department is that of the rescue squads, equipped with high-speed automobile trucks carrying equipment for all sorts of hazardous work. They have gas masks, acetylene torches for cutting steel, a pulmotor to revive persons asphyxiated by smoke, gas or chemical fumes, and jacks for lifting subway cars. "Lifting subway cars after people have fallen or jumped

under them is our specialty," the lieutenant of one of the squads explained the other day. "You'll find that all kinds of odd people manage to get themselves under subway cars. We had a call the other day, jacked up the car and found a fellow under the forward trucks. Right as a trivet he was, not hurt a bit, only the heel of one shoe had been cut off by a wheel.

"We dragged him out and he feels in his pockets. 'I had \$19 in here,' he says, 'and I'm afraid I've lost it.' Later he wants us to give him back his heel."

The fire-rescue squad rolls to most of the big fires and its men often are sent into buildings with gas masks to save lives when men of the fire companies have been driven out by smoke or have been overcome and dropped unconscious while battling the flames.

The rescue squad is sometimes called to fires in the holds of ships. Several ships have caught fire while being fumigated and, in other cases, men have dropped into holds during the fumigating process. A stevedore opened a hatch on a ship filled with sulphur fumes, lost consciousness and tumbled to the bottom of the hold, thirty-five feet below. There was no time to wait for the rescue squad, so the nearest hook-and-ladder company was called.

A ladder was dropped down the hatch and two firemen with ropes tied about them climbed down into the sulphur pit. They found the stevedore and tied a rope under his arms. Both firemen were nearly unconscious when they were dragged from the hold.

The human chain in rescue work requires muscles of steel. Four firemen were on the roof of a three-story tenement house, in which a fire had mushroomed on the top floor, when they heard screams and saw men in the street pointing to the third-floor windows. They looked over the parapet and through the smoke saw a man, who weighed more than 200 pounds, standing in a window while a threatening red glare from the flames outlined his body.

They shouted to him not to jump. Two of the firemen lowered themselves over the edge of the roof with their companions clinging to their legs. The man

thrust his arms upward and the firemen caught his wrists. He swung into space and they lifted him inches at a time with extraordinary muscular power. The firemen who were holding the suspended men worked backward and finally the man who had been lifted from the window was brought to the coping and other firemen who had come to help pulled him up on the roof.

Another rescue requiring desperate risk and almost superhuman strength was performed by Fireman Timothy O'Leary. He came upon a blazing building and saw two women enveloped in smoke in a window of the fifth floor. He raced up the stairs with several men to a window opposite the women in an adjoining building. The men with him grasped his legs and swung him over the area way. Then he shouted to one of the women to lean far out so he could grasp her hands. The other woman pushed her from the window and the fireman caught her clothing. He swung her by one arm across the chasm and then repeated his feat by rescuing the other woman.



The Rescue Squad at Work with a Pulmotor Reviving a Fireman Who Has Been Overcome by Smoke

WHERE TELEPHONE WIRES LINK EAST AND WEST



Exterior of the Chinese Telephone Exchange in San Francisco; a Page of the Directory; Operator and View of Switchboard Force in Working Costumes

"China" telephone exchange of San Francisco is, if not unique, one of the strangest in the world. It is situated in the very heart of a metropolitan city of over half a million population and takes care of the Chinese population, which numbers 14,000. This entire exchange is quite different from anything we are accustomed to seeing. Here are linked the ancient tongues and customs of the Orient

with the most modern of the Occident. The building is in conformity with the characteristics of its environment and has a gaily decorated pagoda roof and balconies. The concrete foundation walls correspond to the stone platforms upon which the Chinese invariably place their buildings to protect them from dampness. The pagodas or towers are receding stories with roofs turned up sharply and high-

ly ornamented. This shape is supposed to shelter the building from the direct rays of the sun and throws off the rain. In China, the roof is the principal ornament of the building, it being considered a sign of dignity to possess several roofs, one over the other. The window lights are of colored glass in imitation of the lining of oyster shells which the Chinese use for lighting purposes. The operators are all almond-eyed daughters of Confucius and are clothed in the gorgeous silks of the Orient. The exchange has 2,320 customers and there are eighteen operators, ten of whom are on duty during the busy hours. About 15,000 calls are handled daily. A telephone directory in Chinese characters is published every six months. The subscribers are listed alphabetically under the names of streets. The street having the largest number of customers is listed first. No alphabetical arrangement of street names is followed as the Chinese can remember street names better than they can the names of customers. The Chinese characters are usually read up and down the columns but in the directory, this arrangement is not followed.

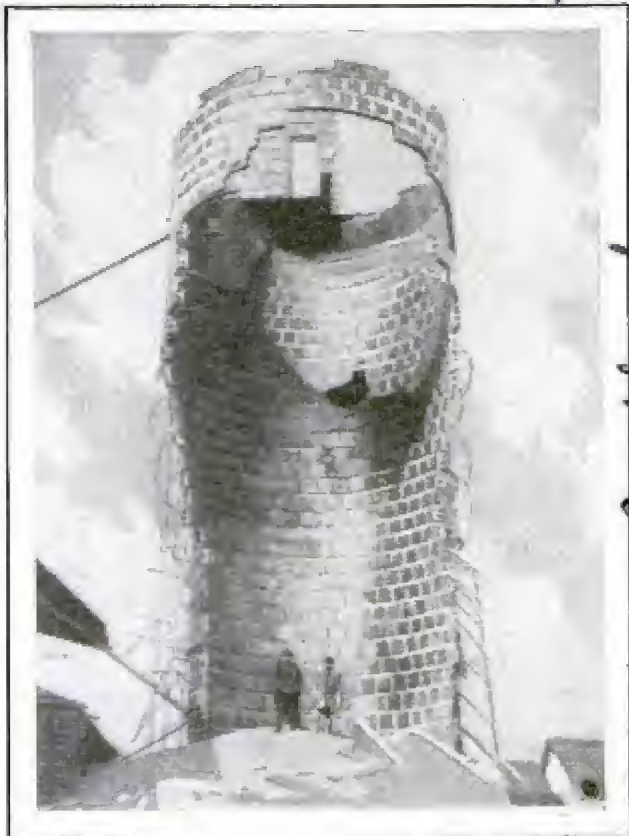
MUSIC ON RIMS OF GLASSES PRODUCED BY FINGERS

Tunes played from fifty-two glasses by the musician's rubbing his fingers over the rims were broadcast from an eastern radio station recently. To produce the different notes, the glasses were of different size and were filled to different levels. To afford the best results, the fingers were slightly moistened. Classical selections as well as simple melodies were played in this manner.



How the Glasses Are Played; Fingers Are Moistened and Rubbed over Rims, Producing Mellow, Bell-Like Tones

COLLAPSE OF TILE GRAIN TANK SCATTERS WHEAT



Grain-Storage Tank after Collapse; Pressure Practically Split Bin in Two, Leaving Half Standing

Eleven thousand bushels of wheat poured in a golden flood from the side of a huge tile tank that burst in an eastern city. A curious feature of the occurrence was that only one side of the bin broke, the other remaining nearly intact. Special construction is necessary in grain tanks and elevators to allow for the weight, expansion due to moisture and the hazard of dust, which not infrequently causes disastrous explosions.

TREES SMALL AS VIOLETS GROW IN CANADA

At an altitude of nearly 8,000 feet in the mountains of British Columbia, are forests of tiny willows so small that a whole grove of them can be held in the hand or an entire woodland crushed under the foot. Violets would overshadow them and their trunks are no thicker than a primrose stem. They cling to the soil with fine hairlike roots and get their moisture from the melting snows. The season of growth is in the summer.

Victor Flour Mills, Inc.
Pittsford, N.Y.

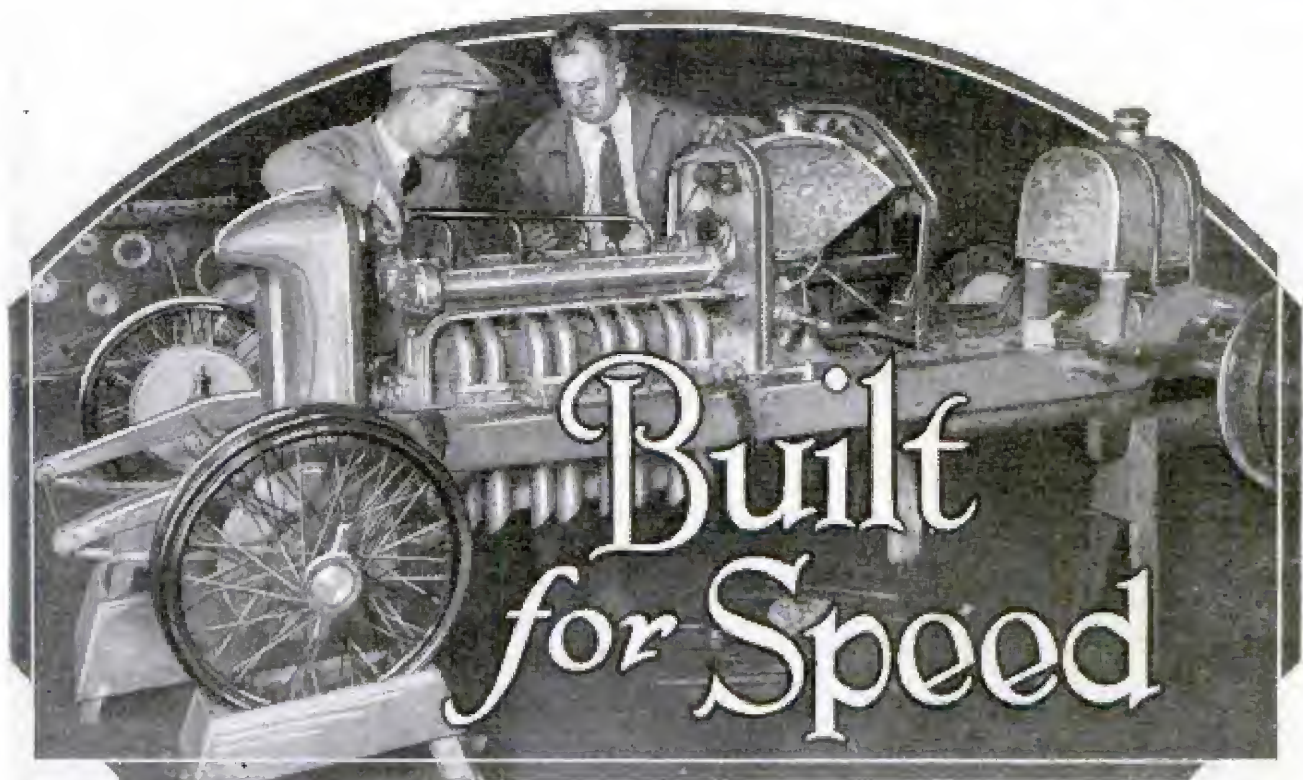
new York Herald
3/2/26
from London mail

Charles Wold, Newark, N.J.

usual glasses. A. Brynne's Phonograph
9512 - 10 9 at St. C. H. N.Y.
MI-ada by-



One-Man Race, Run by Five Cars, All Built by Harry Miller, the Famous Racing Car Designer, Who Has Had as Many as Fifteen of His Entries in the Indianapolis 500—One Car Event Pictured Above Was Won by Bennett Hill, Driving Number Three



Ten-Thousand-Dollar Racers, Machines with the Accuracy of a Fine Watch, Represent Triumph of Engine Builders' Art

By FRED GILLMAN JOPP, 207

*S. Berends St
Los Angeles
Calif*

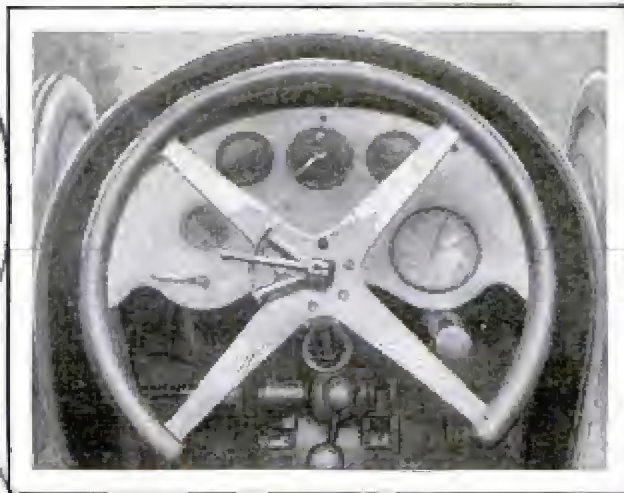
A BOY who couldn't get to school because he had to pass a machine shop on the way, had fifteen racing cars of his own design in last year's 500-mile race at Indianapolis, and probably will have as many more in the great motor classic this year.

Finishing the eighth grade at school, he decided it was better to work in the machine shop than to try to keep on passing it twice a day, so he applied for an apprentice job, and got it. Today every one who has read of automobile racing is familiar with the name of Harry Miller, designer and builder of some fifty Miller specials. The life stories of the three great builders of speed, Fred Duesenberg and Harry Miller, on land, and Gar Wood, on water; are all curiously alike. Each manifested a mechanical bent in early youth; each was tinkering with gasoline engines when

the internal-combustion motor was still a novelty and each has found an abbreviated schooling no handicap in the race for success.

Wood, at the age of thirteen, repaired and operated a government survey-launch when other mechanics failed, and so got into the gasoline motorboat business. Duesenberg, starting as a bicycle racer, built himself a motorcycle pacer, and gravitated from that into automobile building. Miller, as a boy, tinkered with most of the gasoline engines in his home

town of Menomone, Wis., went west and became an automobile repairman when motor cars were rarities, came east again as a machine-shop foreman and tester at the old Yale factory in Toledo, where Barney Oldfield got his start, and out of that association of racing atmosphere and cars to test became a race enthusiast.



Drivers Are Fitted So Tightly in the One-Man Racers That the Steering Wheel Is Cut Away

Los Angeles. Calif.

Miller Engine Works

Those were the days when motor cars belonged to the rich and racing was operated as a gentleman's sport, for cups instead of cash. Miller had the speed fever and rode in one of the early Vanderbilt-cup races as mechanic for Ernie Keeler, but he didn't like the way the crude carburetors of that day worked. He went back to Los Angeles, where he had owned his auto-repair shop before joining the Yale factory, and began to build a better carburetor. It was a success, and was adopted as standard equipment on two

\$10,000—he advised them to do their shopping elsewhere, for he wouldn't build cheap cars. He also pointed out that it isn't the first cost of a racing car that counts, but what the car will earn on the track. And his cars became consistent winners.

When the mechanic was dispensed with a few years ago and racing cars became one-man affairs, the saving in engine weight counted, for the little one-man machines weigh under 1,500 pounds, and are still going down. Twelve hun-



Changing a Tire and Refilling the Gasoline Tank Is Done in Twenty Seconds by a Trained Pit Crew, While the Pilot Has a Chance to Stretch His Cramped Muscles

cars of the day, the Lozier and Interstate. With the carburetor working satisfactorily, Miller's interest ebbed, and he sold the going concern to a capitalist and started looking around for something else to be improved.

Barney Oldfield wanted a new and better motor for his famous Delage racer, and Miller offered to build it. It was a success. Christophson, an early aviator, heard about the new motor and asked the new builder to turn out an aviation engine. Miller built that too. Other race drivers offered orders for motors, and with that beginning, he became one of the two outstanding racing-car designers of America.

But the race drivers were amazed by his way of building cars. He refused to build them any way except his own. He spent weeks hunting for special grades of steel and in machining parts to a fraction of a thousandth of an inch. He was soon making motors lighter and better than any that had been made before, proving that his ideas were right. When the pilots grumbled at the cost—a Miller car costs

dred pounds is a possibility with the new and smaller engines, which have a displacement of but $91\frac{1}{2}$ cubic inches.

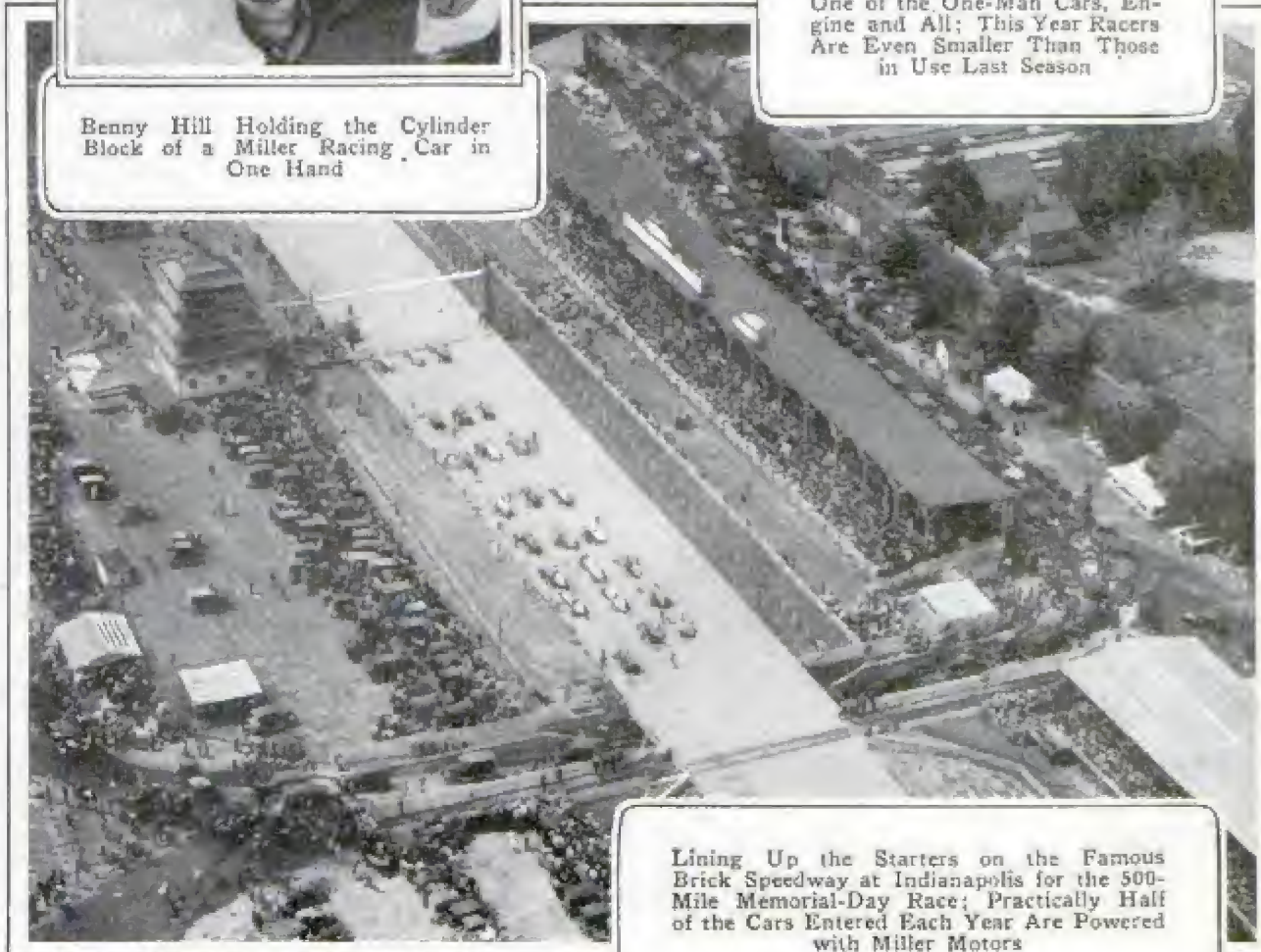
To operate such a lightweight car at speed of 120 miles an hour, and better, requires perfect balance and the complete elimination of engine vibration. Moving parts must fit more perfectly than those of a fine Swiss watch, and, with accidents constantly happening on tracks far removed from the factory, every part must be standardized so that replacements will fit as perfectly. If a driver wants a new connecting rod for his Miller racer, it costs \$65, but the Miller rod is so perfectly machined and fitted that each one turned out weighs exactly the same, to a fraction of an ounce. Other parts are made with the same perfection. A slight shift in the weight of any part, upsetting the carefully calculated center of gravity of the car, might prove fatal in a race.

There are many things about these cars and their builder as unique as the accuracy with which they are built. Visit a European race track and try to look under the hood of a car and the pilots prob-



Benny Hill Holding the Cylinder Block of a Miller Racing Car in One Hand

A Man of Average Strength Can Pick Up the Front End of One of the One-Man Cars, Engine and All; This Year Racers Are Even Smaller Than Those in Use Last Season



Lining Up the Starters on the Famous Brick Speedway at Indianapolis for the 500-Mile Memorial-Day Race; Practically Half of the Cars Entered Each Year Are Powered with Miller Motors

ably would call out the army. But go into the plant of the Miller engine works and the owner will show you around, explain every detail, and, even if you are an engineer, permit you to take measurements and examine the motor parts to your heart's content. The explanation is that he regards the completed achievement as public property, and is already planning in his mind the improvements on the next car. What he has in his mind is the factory secrets, and no visitor can get them.

His cars are expensive and are to be taken as they are or not at all, but his business methods would be the despair of

an efficiency expert. One driver smashed up his new \$10,000 car in one of his first races and came back to buy another. Miller looked over the wreckage and refused to sell another. Instead, he advised the driver to salvage the motor and some other parts which were undamaged and build a new car around them at a cost of \$2,000. Frank Lockhart, a young driver who broke all DePalma's dirt track records last year, wanted a Miller car, and the motor builder made him buy it and earn it both, for he put him to work in the factory and paid him to build his own car, part by part, so that he would never have any trouble.

The reduction of the motor size this year to a vest-pocket-size engine of only 91½ cubic inches' displacement will result in all new jobs being seen at the Memorial Day race, and starts the motor builders on a new task of perfecting this size of engine. The previous 122-inch cars were thoroughly tried out and proven, just as each larger size which preceded them had been thoroughly tested.



Harry Miller with His Front-Drive Racer, and, in Oval, Benny Hill, Who Landed It in the Money in Last Year's 500-Mile Classic, Vindicating the Builder's Judgment



On This Wire-Netting Canopy, Branches Are Laid to Protect Young Trees Growing Below from Frost; the Covering May Be Securely Interwoven to Resist Winds

BRANCHES AND WIRE BLANKET KEEP FROST FROM TREES

Young trees under cultivation at an English forestry are protected from frosts by branches laid on wire netting, about fifteen inches above the tops of the seedlings. Advantages of this plan are that the wire foundation is not easily disturbed by winds, permits ample ventilation and, that the sun can reach the plants when the branches are removed.

LAKE SHORES DIFFER IN HEAT BECAUSE OF WINDS

Water's effect on the winds is illustrated in the differences in temperatures between the west and east shores of the Great Lakes. In summer, the east side generally is cooler, while, in winter, it is warmer. This is due largely to the fact that the prevailing winds are from the west. As they blow from the hot land areas during the summer, they become cooled while passing over the lake since the water never becomes so hot as the land. In the winter, the lake remains warmer than the land,

hence the winds rise in temperature as they sweep across, and sometimes raise the mercury on the eastern shores several degrees. For this reason, the district bordering Lake Michigan on the east is favorable to the raising of fruit.

HORSE OF HAWTHORN HEDGE GROWN IN NINE YEARS 1500

By patient and careful trimming, a veterinary surgeon has shaped a hawthorn hedge he planted in 1917, into the form of a horse. Repeated cutting is necessary to preserve the outline of the figure and its symmetrical shape.



Hawthorn Hedge Nine Years Old, Trained into Figure of Horse

Stuart MacKenzie

Little England.
Braham.

Chicago Evening Post.
3/2/26.



Diver's Suit, Padded and Flexible, Keeps Wearer Warm for Hours Although Water Is Icy

DIVING SUIT PREVENTS CHILL EVEN IN ICE WATER

For use at moderate depths, a diving suit that is said to keep the wearer warm even in ice-cold water permits free movements of the feet and arms. In a recent test, a man is reported to have remained submerged in fifteen feet of cold water for fifteen hours without discomfort.

PROFIT FROM RAISING INSECTS TO DEVOUR FRUIT PESTS

Thousands of ladybirds are raised and sold at a profit from the insectary established two years ago at Santa Barbara, Calif., to devour the mealy bugs which menace the lemon trees. The first year, the county raised 50,000 ladybirds and during the next season, 183,000 were sold at two cents each. It is planned to raise 200,000 this year to keep the orchards commercially clean from the harmful bugs. The ladybirds are also protectors of walnut orchards, and of lettuce and other vegetables.

WOMEN'S SHOES ARE LARGER DUE TO STYLE AND SPORT

The average size of women's shoes has increased from four and one-half to six and one-half in the last six years, according to a report recently made to the national shoe retailers' association. Changes in style, and the participation of women in athletics are believed largely responsible for this development. It was also declared that women's ankles have grown half an inch thicker as a result of wearing low-heeled oxfords. Style experts are speculating as to just how far this tendency will go and when the trend will start the other way, back to smaller shoes. They point out that foot fashions, like others, have undergone numerous cycles. There was a square-toe vogue in England at one time until Queen Mary (1516-58) issued a proclamation forbidding widths greater than six inches. High heels came to America before 1790, but suddenly went out because of a Paris edict; then returned in 1853. Toward the latter part of the seventeenth century in Venice, it became the custom for women to wear "chopines" or exceedingly high shoes almost like stilts. The height of the footwear indicated social prestige.

MAGNIFYING GLASS FOR DESK HAS OWN ELECTRIC LIGHT

Set within an easily adjusted holder, a magnifying glass for desk or table use is provided with a special electric light and permits the operator more freedom, as both his hands are free. The magnifier may be set at horizontal or vertical positions, and the lamp is so arranged that necessary illumination of the object or the glass is easily effected.



CARE IN TRAINING DOG TEAMS SAVES HUMAN LIVES

In northern Canada, where travel is done almost entirely by sleigh, teams of five to seven dogs will bring \$500 or \$750, depending upon their strength and the efficiency of their training. Frequently the lives of the dogs and the driver may

1452

1495

1506

1530

J. C. Escherich entomologist
in charge

New York Herald
3/8/26

M. B. Leech in New York Times
Baruch + Lomb
Rochester, N.Y.

1437

Herndon, Va.
3/6/26



Thrills of the Vanished Frontier Recalled by Novel Archery Practice; Shooting at Buffalo Target from Galloping Horse, a Stunt for Both Marksman and Rider

depend upon how well the animals have been taught. One of the hazards of journeys is the presence of air holes in the ice on frozen-over rivers. If the dogs are not taught to halt promptly when the command is given, they may plunge themselves, sled and master into the water. To teach them, they are often driven directly into one of the death traps. The icy bath that follows their disobedience to orders usually makes them respond to future commands. An average team can pull a loaded sleigh seven miles an hour, ten hours a day and seven days a week. The dogs sleep in the open even when the temperature is fifty degrees below zero and can live on half of a jackfish a day. Drivers do not try to make pets of their teams, as a rule, for there is too much wolf in them for safety. They have been known to attack their masters when exhausted from cold and hunger, but there are also many instances of devotion displayed by the dogs. One Christmas, several years ago, a priest was taking a load of presents to an orphanage in the frozen district of northern Manitoba. He did not arrive, and when the dogs appeared one by one in other parts, it was realized that the padre had met with disaster and search parties were organized. The priest was found dead and over the corpse, faithful to the end, stood the leader of the team. The dog fought viciously before it was finally dragged away from its master.

☐ In China, the annual rainfall is from thirty to seventy inches.

SPORT OF HORSEBACK ARCHERY TESTS RIDER'S AIM

Horsemanship and skill as an archer are both required in a healthful outdoor sport becoming popular in California. The players in action suggest scenes from the vanished west, for the target is a realistic and life-size painting of a buffalo. As the rider sweeps past, he endeavors to keep steady enough in the saddle to take a good aim and hit the "beast" in a vital spot. The task involves all the usual problems of archery in addition to those caused by the rapidly moving horse.

LETTUCE ROOTS PROTECT FURS FROM INSECTS

To safeguard furs from insects while in storage or transit, a preparation introduced by an English dealer is said to be composed mainly of lettuce roots grown to large size, then dried, roasted and ground. The effect of the powder is said to be lasting; it is clean to handle and resembles coffee in odor and appearance. Fur treated with the powder showed no moth ravage after several weeks.

WALKER STICK PROVIDES MUSCLE EXERCISE

Providing healthful sport and exercise, a walking stick that has no springs to get out of order, affords children a chance to develop their skill in balancing. Standing on the crossbar, the rider wobbles along by first moving one leg forward and then the other.

Practicing the Wobble Walk on Exercise Stick

Wobblers Walker Co.
304 City Bank Bldg.

Article by L. C. Southwate in London Mail

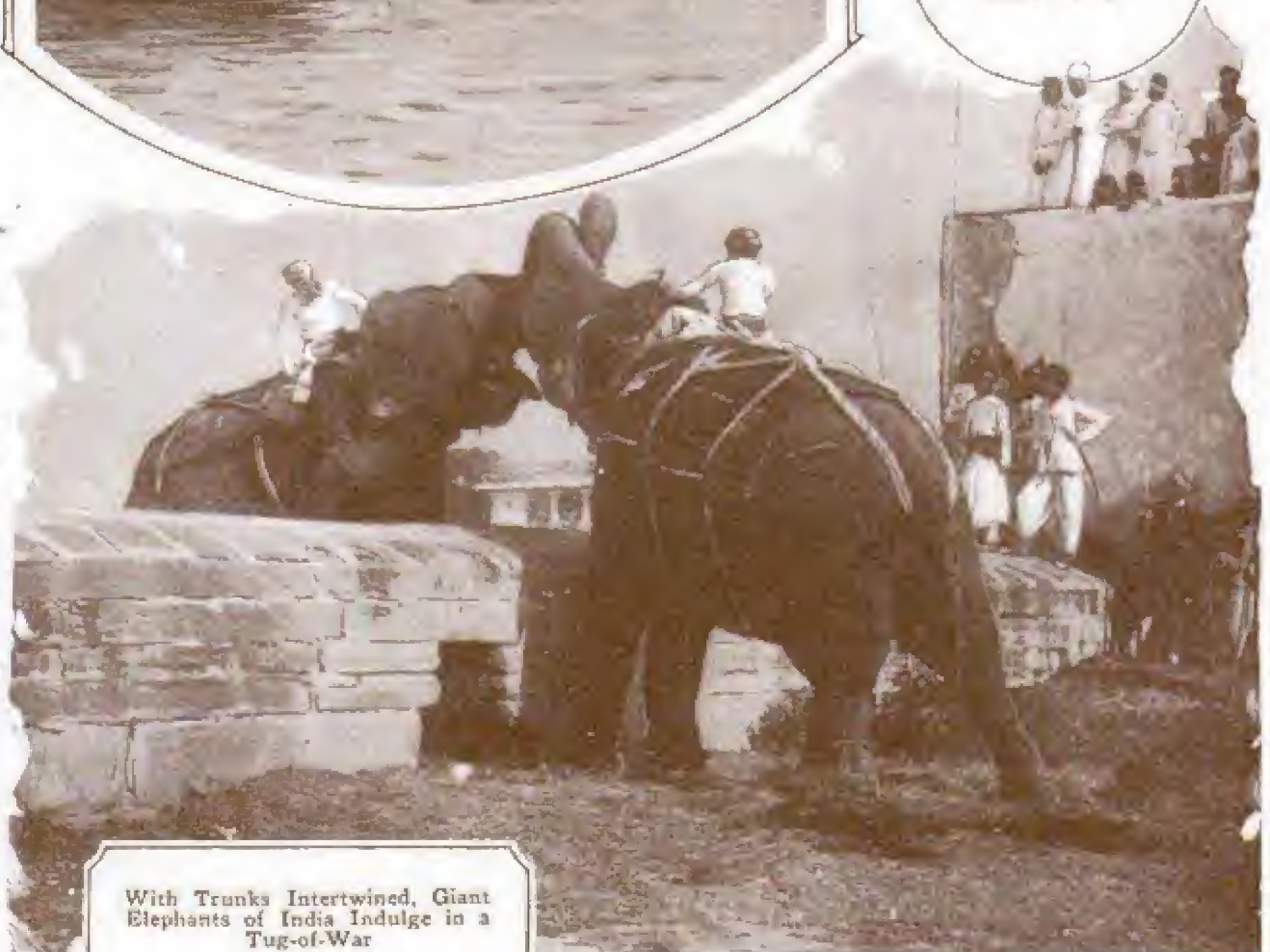
Cont. George W. Hadden,
1 High Street, New Road,
Tipton, New Road,
Chatterfield, Eng.

Strange Sports and Pastimes

Tilting Boats Also Baylors & Co
22-2-42 New York



Sports of Many Kinds Relieve the Monotony of the Sailor's Life; a Feature of the Annual Games Held by the Crew of a British Warship Is the Obstacle Race Pictured Above, Barrels and Other Objects Impeding the Contestants' Progress; at Left, a Tilting Tournament in France; the Players Stand on Boat Platform and Try to Topple Each Other into the Water with Long Poles



With Trunks Intertwined, Giant Elephants of India Indulge in a Tug-of-War

Seen in All Parts of the World



In Holland, the Slide Is More Important Than the Sled; Boys Push Themselves with Sticks over the Ice While Seated on Stubby Runners; at Right, the Old-Time "Cock Fight" with Variations; Players with Hands Clapsed around Stick under Knees Try to Knock Each Other from Floating Platform

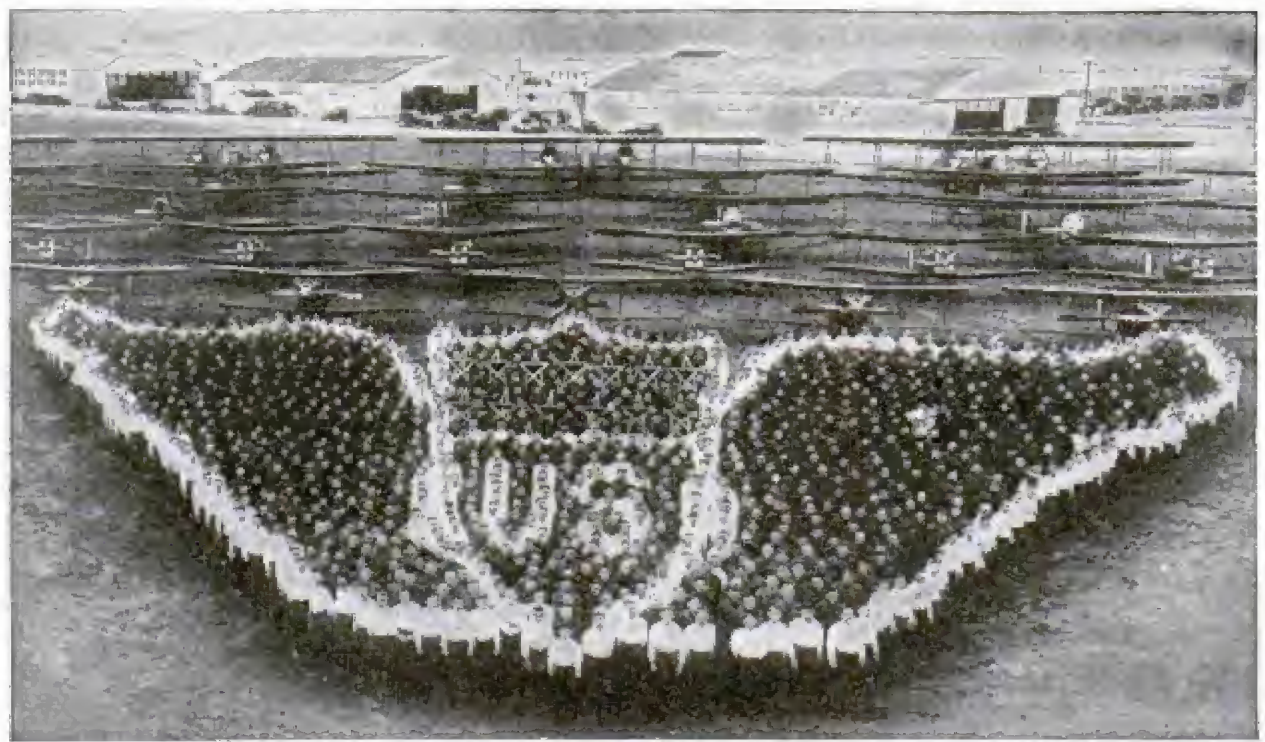
Right Photo © U. & I.



Proving That Bullocks Can Run, an Exciting Race in Java

1542

THIRTEEN HUNDRED MEN FORM LIVING WINGS

Picture

© National Photo Service

Men and Planes at Kelly Field Grouped for Insigne Photograph; Distortion Was Avoided by Placing Many More Figures in the Background Than in Front

San Antonio, Texas.
To form the insignie of the air service, 1,300 men at Kelly Field were carefully grouped and photographed from an elevation. The outlines of the design were traced with men wearing white shirts, and the problem of distortion was solved by placing many more figures in the back of the group than in front. For instance, there were twice as many men in the tip of the left wing as in the entire front line at the base of the design, and the top of the shield required about as many figures as were placed at the front of the whole layout, although the width of the shield appears much less in the photograph. An apparent illusion was created by the arrangement of the airplanes, representing part of the entire \$5,000,000 outfit at the field. Eleven were placed in front and only five at the back, but the latter were huge bombers and seemed to be of the same size as the smaller ones on account of their distance from the camera.

MOVE TO SELL EGGS BY WEIGHT INSTEAD OF BY NUMBER

149 Believing it unfair that the farmer who sells large eggs should have to take the same price as the producer who markets small ones, the agricultural ministry of England recommends that the eggs be sold by weight instead of by count. It

is proposed to establish three standard sizes and three quality grades, and prices would be determined upon a strict weight basis, or a combination of weight and quality, under a national grading scheme. The system, it is believed, would result in an improvement of the product as it has done in other countries where it is in force. Eggs have been sold by weight for several years in one of the counties of northern Ireland and the eggs there are noted for their size.

HEADLIGHT INDICATORS SHOW WHEN LAMPS ARE ON

55 Night automobile driving is made less hazardous by small glass indicators that



Auto-Lite
fit over the lens of the headlights so that the driver can see from his seat if both lamps are burning. The ends of the glass pieces extend above the top of the lamp case so that the glow of the bulb is reflected to the tip of the indicator, showing the driver if the lights are on.

Conn. Bridgeport. American

Christian Science Monitor

1917
 Cnt. Everett Spring
 Bureau of the Census
 POPULAR MECHANICS
 Washington, D. C.

917
 1407

EIGHTY THOUSAND ADDED TO MOTH COLLECTION

What is said to be the largest collection of moths and butterflies in the world is now housed in the National museum. It represents specimens from all parts of the world and included in the groups are species so rare that they are seldom seen except in pictures and textbooks. The exhibit totals more than 380,000, of which more than 300,000 are on shelves, protected by camphor fumes. Not long ago, the museum's collection was increased by one of 80,000 moths obtained from an amateur French scientist who had spent forty years gathering the specimens. It was purchased for \$50,000, part of the money being raised by private subscription.



Exhibit of Knots and Rope Fibers at Hardware Show; Nearly Every Kind of Splice and Hitch Was Included

STOPPING MOTOR LOCKS AUTO TRANSMISSION 1428

Absent-minded motorists who continually forget to lock their cars are afforded aid in an automatic attachment that secures the automobile against theft the instant the engine stops running. It is an auxiliary to the transmission lock and is governed by the flow of oil. As soon as the motor stops and the lubricant pressure ceases, a lever is actuated, throwing a bolt on the transmission lock. The attachment can be regulated so that it will not set immediately, a two-minute delay being possible if desired, and cars so locked may still be pushed out of the way in case of fires or other emergencies. It works



Inventor with Auto-matic Auto Lock Operated by Oil

whether the transmission is in gear or not, so that the lock will operate even in reverse to hold cars on a grade.

KNOTS AND SPLICES FEATURED AT HARDWARE SHOW

Mounted on a large display board a collection of some 250 different kinds of knots, splices and hitches formed an interesting exhibit at a hardware show. Practically every "twist" used in construction work, on ships and in other fields was included in the assortment.

STANDARD CLOCK LOSES ONLY ONE SECOND IN FIFTY DAYS 1423

Inclosed in an air-tight chamber and wound by electricity twice a minute, one of the government's master clocks at Washington, D. C., varies only two one-hundredths of a second a day. The instrument is used for measuring intervals at the bureau of standards. Its time is checked each day at noon with signals from the naval observatory, where solar observations are taken to set the time.

Building
 at Mechanics
 Boston, Mass 2/28/26

Spencer City
 2/29/26

Portland, Ore.

and A. W. Wassell

1523 Cont. No. 100. Walcott Ave
Newport Co. d.



Narwhal with Its Long Spiral Tusks, a Curiosity of the Arctic Seas

WHALE WITH TWO IVORY TUSKS FOUND IN ARCTIC SEAS

One of the most remarkable and little known marine animals of the world is the narwhal, a species of arctic whale that makes its home in the polar seas. The male is distinguished by the abnormal development of its left front tooth which sometimes attains a length of eight feet or more. It tapers slightly to a pointed hollow tusk, the surface of which is marked by spiral grooves and ridges. Occasionally, both teeth develop in this manner. The narwhals congregate in schools, feed on small fish and crustaceans and form a picturesque sight when plowing through the water, their long glittering horns rising in unison as they come to the surface to "blow." The exact purpose of the tusk is not known, but is believed to be for defense or for breaking through ice. The whales have never been known to

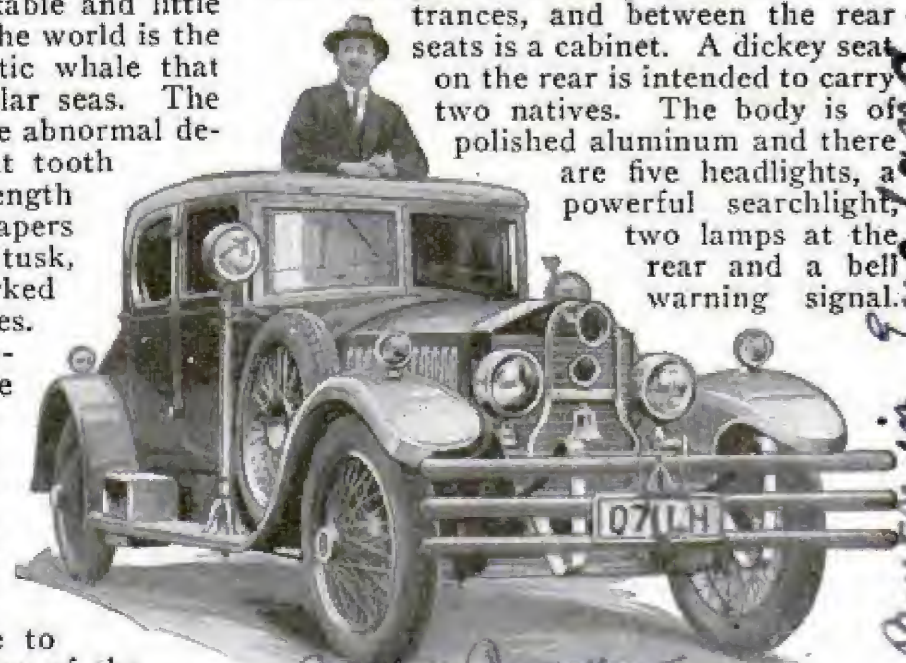
charge and pierce ships as the swordfish do. Because the tusk is hollow, it is of little use except for making small articles, although the ivory is of fine quality.

AIRPLANES FOR COAST GUARD TO AID SHIPS IN DISTRESS

Members of the coast-guard service assigned along the North Atlantic coast will take to the air while patrolling for rum runners and going to the aid of vessels in distress. Five planes have been ordered for delivery not later than November 1, officials have announced. Each will be equipped with radio for prompt communication with patrol boats and will be expected to meet rigorous requirements as to seaworthiness, radius of action, military value, cost of upkeep and size. Manufacturers have been asked to submit types of models already constructed rather than attempt to make a special plane for this service. Eventually, it is hoped that the airplane's use will be extended to all parts of the country's coastline.

MOTOR CAR FOR TIGER HUNTERS HAS SLIDE DOOR IN TOP

Motor expeditions against tigers are planned by an Indian prince who has had a special automobile built for the purpose. One of its principal features is a sliding door in the top, permitting the hunter to stand on the seat and shoot at the game through the roof. The front seats are of the "fly-up" kind, for quick exits or entrances, and between the rear seats is a cabinet. A dickey seat on the rear is intended to carry two natives. The body is of polished aluminum and there are five headlights, a powerful searchlight, two lamps at the rear and a bell warning signal.



Automobile Built for Indian Prince's Tiger Hunts; Sliding Door in Top Permits Unobstructed Aim

Roller Dodge Chassis
Body Messrs. E. B. Wylder
Bayer in England for Maharajah of Bhawalpur

Hunting Comets

Rare Photograph Showing Thousands of Stars and Vast Light and Black Nebulae

Black Lanes, Almost Barren of Stars, Are One of the Still Unsolved Riddles of the Sky

A YOUNG farmer boy sitting in a home-made observatory on a farm in northwestern Ohio, one night a few months ago, after the chores were done, looked up at the skies and found a new comet, and another heavenly visitor received a name.

Peltier's comet—named for Leslie C. Peltier, the boy who found it—is another addition to the long list of solar wanderers discovered by and named for amateurs who took up astronomy as a hobby and succeeded, by their discoveries, in writing their names into the sky's records forever.

Two factors have made comet hunting a distinctive amateur sport, open to anyone with an interest in studying the heavens. The first reason is that the big professional observatories have their schedule of work mapped out for years ahead and

cannot take much time looking for new comets, and the second is that a small and fairly inexpensive telescope can be used, often with more success than the big refracting instrument of a large observatory. Added to this is the third factor that there are plenty of comets to be discovered every year—nine or ten new ones were found in 1925.

The mystery of the solar system has attracted millions since the dawn of time, and the interest is growing constantly, particularly since the relation of sunspots and other solar phenomena to weather on earth was discovered in recent years. In every big city the street-corner barker, offering a close-up of the moon through his telescope on payment of a dime, is a common



World's Biggest Refractor, the Forty-Inch Telescope at Yerkes Observatory



Twenty-Four Inch Reflector at Yerkes. Built in the Observatory Shops. One of Its Photographs of the Familiar Pleiades, and, at the Bottom, One of the Women Astronomers at the Eyepiece of a Twelve-Inch Refractor



as a boy on a farm. The country and small villages have produced more than their share of the amateur and professional astronomers. Away from the smoke clouds that hang over big cities, the boy on the farm has a better chance and more time to look and puzzle over the mysteries of the stars.

Born on a farm near Cottage Grove, Wis., Mellish as a boy built a small reflecting telescope, and before he was of age, had found and given his name to a dozen new comets. Without guidance, or knowledge of where and how to obtain sky charts, he figured out and

made his own at home. Through his comet discoveries he came to the

attention of the big observatories, and before he was twenty-one was invited to Yerkes observatory, at Williams Bay, to spend a year and a half studying and using the equipment there, including the world's biggest refracting telescope, a giant with a forty-inch lens.

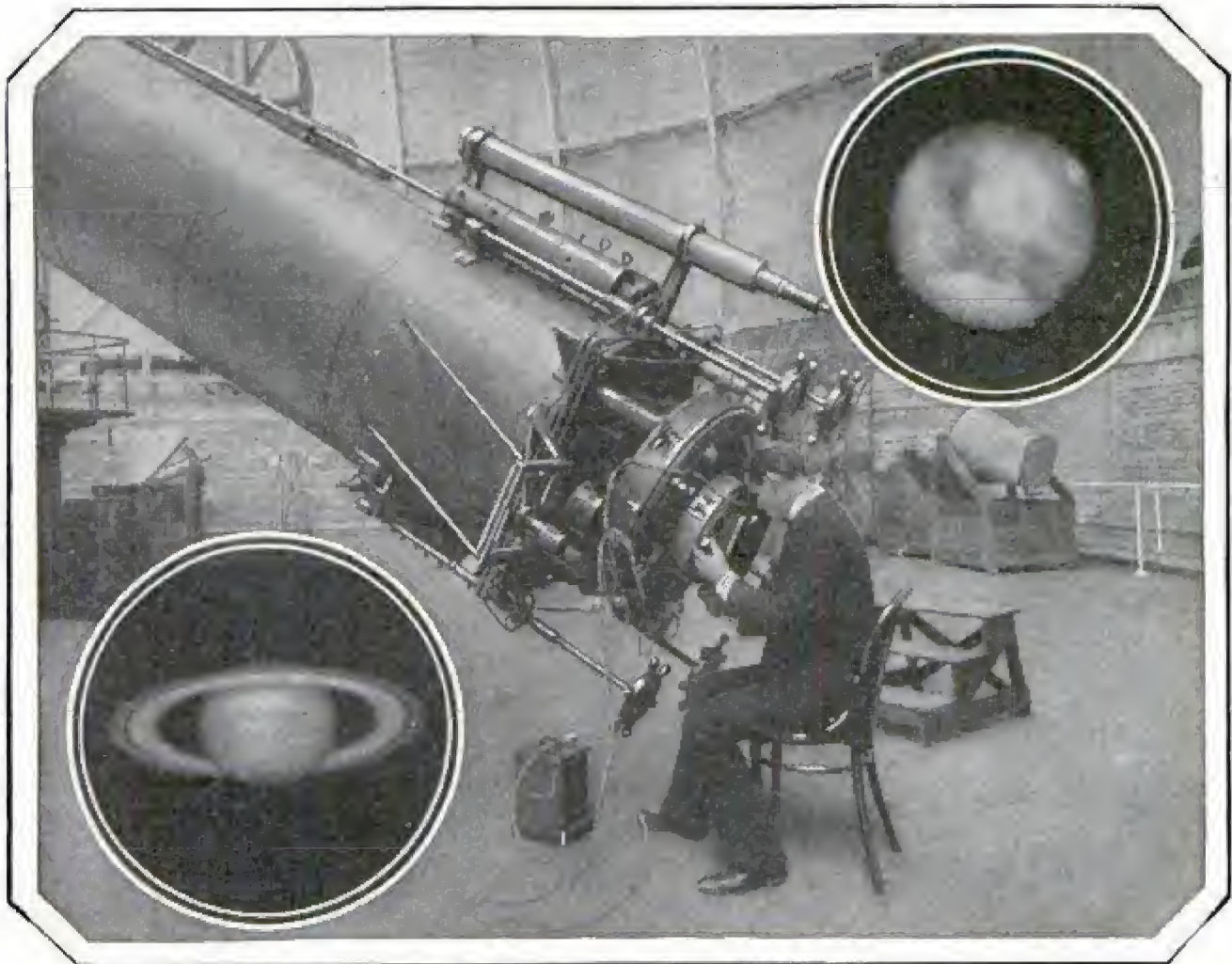
sight on summer nights, but hidden away on the roofs are dozens of small observatories which usually escape public attention. A half dozen or more bankers in Chicago own five-inch refracting telescopes, expensive and well-made instruments, with high-priced lenses, and with them they have spent many hours studying the skies.

The refracting telescope, with its expensive lenses, is chiefly an instrument for the wealthy or the observatory, but for every one of them there are several reflecting telescopes, mirror devices which are cheaper to buy or can be made at home. And for comet seeking they often prove better than the big refractor, for the comet finder produces a brighter image with a large aperture and short focal length, the two points which can best be obtained with a mirror instrument.

How many hundreds or thousands of Americans have made their own telescopes no one knows, but a single instrument maker, John E. Mellish, has supplied instructions to as many as 400 people in one year. Mellish, like Peltier, became an astronomer through watching the stars



1848 Howard Ave
Wilmette, Ill.
Edward
Elgin



The Business End of the Forty-Inch Refractor in Its Ninety-Foot Dome; Inset, Top, Mars with Its North-Pole Ice Cap, and in the Lower Corner, the Planet Saturn and Its Rings

He became, in turn, director of a small observatory in Ohio, and then an instrument maker, producing both lenses and mirrors, and now has one of his lenses in use at Yerkes observatory, where he received his training.

The start of Peltier on the road to be an astronomer was equally simple. "A natural inclination for it," was his explanation after he had found his comet. Ten years ago, while still a school boy, he built a small one-inch telescope, just a crude homemade instrument with a magnifying power of only a few diameters. That served for a few months, and then he invested in a two-inch telescope, doubling his range of vision.

In December, 1917, he joined the American association of variable-star observers, a nation-wide organization of amateur astronomers, and a year later they loaned him a four-inch refractor, which he used for four years. Then Princeton observatory, interested in the extent and accuracy of his reports, sent him a six-inch telescope, and with this he found his comet.

He has specialized in the study of variable stars and has led the country with the greatest number of observations for five

years. His other chief pursuits are comet seeking and the observation of telescopic meteors.

At the edge of a clear field beside the Lincoln highway, young Peltier, with the help of his father, built a small observatory, complete with revolving dome, and here he works every clear night.

The list of amateurs who have made noteworthy contributions to star gazing is a long one. George E. Hale, builder and first director of the great Yerkes observatory, was only a boy in college when he invented the spectroheliograph, one of the most important contributions to astrophysics since the discovery of the telescope. With it the spectrum of the sun is examined and analyzed, determining the gases and material which go to make up the center of the solar system.

Hale, as a boy in Kenwood, a Chicago suburb, operated a small observatory on the roof of his home. Coming from a wealthy family, he chose to be an astronomer, and studied with that end in view. Charles Yerkes, the traction magnate, was a neighbor and family friend, and when Chicago university was built, young Hale interested Yerkes in building and endow-

President. Ernest S. Yalden.

120 Woodbridge Place, Lenoir, N.C.



Peltier be-
 side the Home-
 made Observatory
 Where He Discov-
 ered His Comet; the
 Great Spiral An-
 dromeda Nebula, a
 Mass of Suns Great-
 er Than Ours But
 So Distant Their
 Light Blends To-
 gether; Below,
 Hale's Spectroheli-
 ograph in Use



ing a great ob-
 servatory to be
 operated in
 conjunction
 with the new
 institution. Hale was only twenty-four
 when he became head of this observatory,
 with the largest refracting telescope that
 has ever been built.

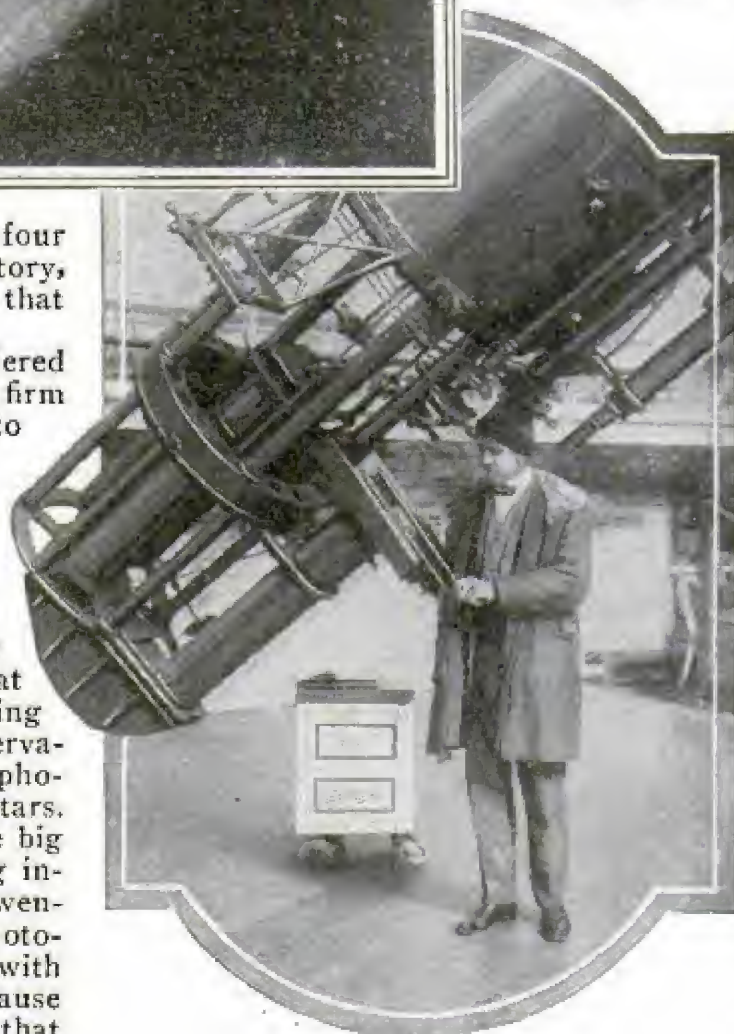
A California observatory had ordered
 the glass disks cast by a famous Paris firm
 of optical makers, but was unable to
 raise the money for figuring and
 mounting them. The two big disks,
 forty-two inches in diameter, were
 exceptionally perfect, so Hale, with
 Yerkes' backing, secured them, had
 a huge mounting built, with moving
 parts weighing twenty tons, and the
 disks figured, a grinding operation that
 consumed five years. For the exacting
 scientific work planned for the observa-
 tory the big telescope is ideal, but for pho-
 tographing and studying the larger stars,
 planets, nebulae and comets, even the big
 observatories use a smaller reflecting in-
 strument, with silvered mirror. A twenty-
 four-inch reflector at Yerkes photo-
 graphs stars which cannot be seen with
 the big forty-inch refractor. It is because
 of the power of the reflecting mirror that

astronomy has been adopted as a hobby
 by so many hundreds of people. With
 only one mirror surface to grind instead
 of the four surfaces of two lenses, as in
 the refractor, the instrument is consider-
 ably cheaper, and can even be made at
 home, since the mirror may be ground by
 rubbing two disks of glass together, with
 abrasive powders between.

With a constant supply of new com-
 ets to be discovered each year, the field
 left open for the amateur provides plenty
 of interest. At least six or eight comets
 that are visible in a small telescope appear
 each year, many of them being new and
 previously undiscovered visitors. Bright
 comets that can be seen by the naked

eye, such as Hal-
 ley's, which was
 here in 1910, are
 of much rarer
 occurrence, not
 more than twenty
 or thirty hav-
 ing been seen in
 any one century.

The mystery
 of the comets
 adds to the lure
 of finding them.



1499



Left, Peltier at the Telescope with Which He Found the Comet Named for Him

Above, Daniel's Comet; the Stars Appear as Dashes on the Photographic Plate

The probable orbits of many of them show that they may not come back within view of the earth for centuries, or even thousands of years. A few, probably attracted by the planet Jupiter, make regular visits, but these, whose periods have been established by two or more observations, number barely a score. Of these, Halley's, which was first observed in June, 1456, forty-six years before the discovery of America, is not only the oldest known, but has the longest period, since it returns to view only every 75.9 years. Encke's comet, coming around every 3.29 years, has the shortest orbit known.

The spectrograph has classified the gases which go to make up the comet and its tail, but the exact nature of the head remains a mystery. It was presumed to be a solid mass, sufficiently large to hold its parts together and resist the pull of the sun, but when the great comet of 1882 passed across the face of the sun, an observer at Cape Town, South Africa, was

watching and saw the head disappear, instead of showing as a black dot, as had been expected. Its disappearance indicated that the head was largely composed of gases so thin that they failed to intercept any appreciable quantity of the sun's light, and that if any solid mass was present, it was so small as to be unnoticed. Unless there is some mass

present, the theory that meteor showers are largely the debris expelled by the dissolution of a comet will have to be abandoned.

Several periodic meteor showers are believed to be of comet origin. For many centuries, at intervals of about one-third of a century, there were showers of meteors from September 13 to 15, and astronomers believe they were caused by particles left behind by a comet which was first observed in 1866. Similar showers in August, at various times over several centuries, are attributed to a comet first seen in 1862, and Biela's comet, one of the periodic visitors, is credited with another series of meteors.

1499

The growing interest in the relation of solar phenomena to the weather, as stated above, increased the popularity of astronomy as an amateur hobby. The terrific storms which sweep across the sun's surface, becoming visible in the telescope as sunspots and vast columns of flaming gas, offer an interesting field for amateur study. A new explanation of the sun's heat, based partly on Prof. Einstein's theories and recently checked by American observatories, estimates that 4,000,000 pounds of matter must be destroyed every second on the sun, by the breaking down of atoms. On that basis, and if the destruction continues at the same rate, the vast bulk of the sun could furnish heat for countless millions of years. Of all the matter destroyed each second, however, the heat and energy from only four pounds reach the earth. The figures show that undreamed-of amounts of energy are contained in matter.

If astronomers ever succeed in solving the mystery of the complete breakdown of matter, which makes it yield such amazing amounts of energy, the world's life may be completely revolutionized. Compared to the record of the sun, the most efficient mechanical power source yet invented has such an infinitesimal degree of efficiency that the comparison cannot be stated in any understandable percentage. Nothing but radium, which so far remains unharnessed, can approach the power output attained by the stars.

A burning oil or gas well, with flames leaping hundreds of feet into the air, represents the most awe-inspiring fire ever ignited on earth, but when compared to the sun's flames, curling through space as much as 200,000 miles from the sun's surface, the oil fire becomes less than a match flame. The earth itself, with a diameter of nearly 8,000 miles, is dwarfed in comparison with these prodigious fires. Three photographs of sun flames, taken in the early part of this year at Yerkes observatory, show solid flame belts covering the entire sun surface to a depth far greater

than the earth's diameter, while the enormous tongues of flames give an appalling picture of the destruction that lights and heats the world.

The sun requires somewhat complicated apparatus for study, but the amateur is left with an interesting field in the planets and more familiar star groups, such as the Pleiades, the Dipper, the Bear and others. The planets Mars, Venus and Jupiter and the moon are easily studied even through a small telescope, and the latter in particular, because of its closeness and the fact that it is a dead world, presents a constant source of mystery. The vast craters and mountains which the telescope shows on its surface, and which may be easily photographed, are as much an unexplained riddle today as they were years ago. Whether the craters are those of long extinct volcanoes, gigantic fire pits burned out at some time when the moon, like the sun today, was a raging mass of flames, or whether they are the scars left by some terrific bombardment of vast meteors, remains to be determined. One of the big craters alone, measured by the shadows cast across its bottom by the sun, registers a depth of 18,000 feet, while twin peaks rising from its center show heights of 10,000 and 12,000 feet.

GUN FOR LAUNCHING AIRPLANES GIVEN SUCCESSFUL TEST

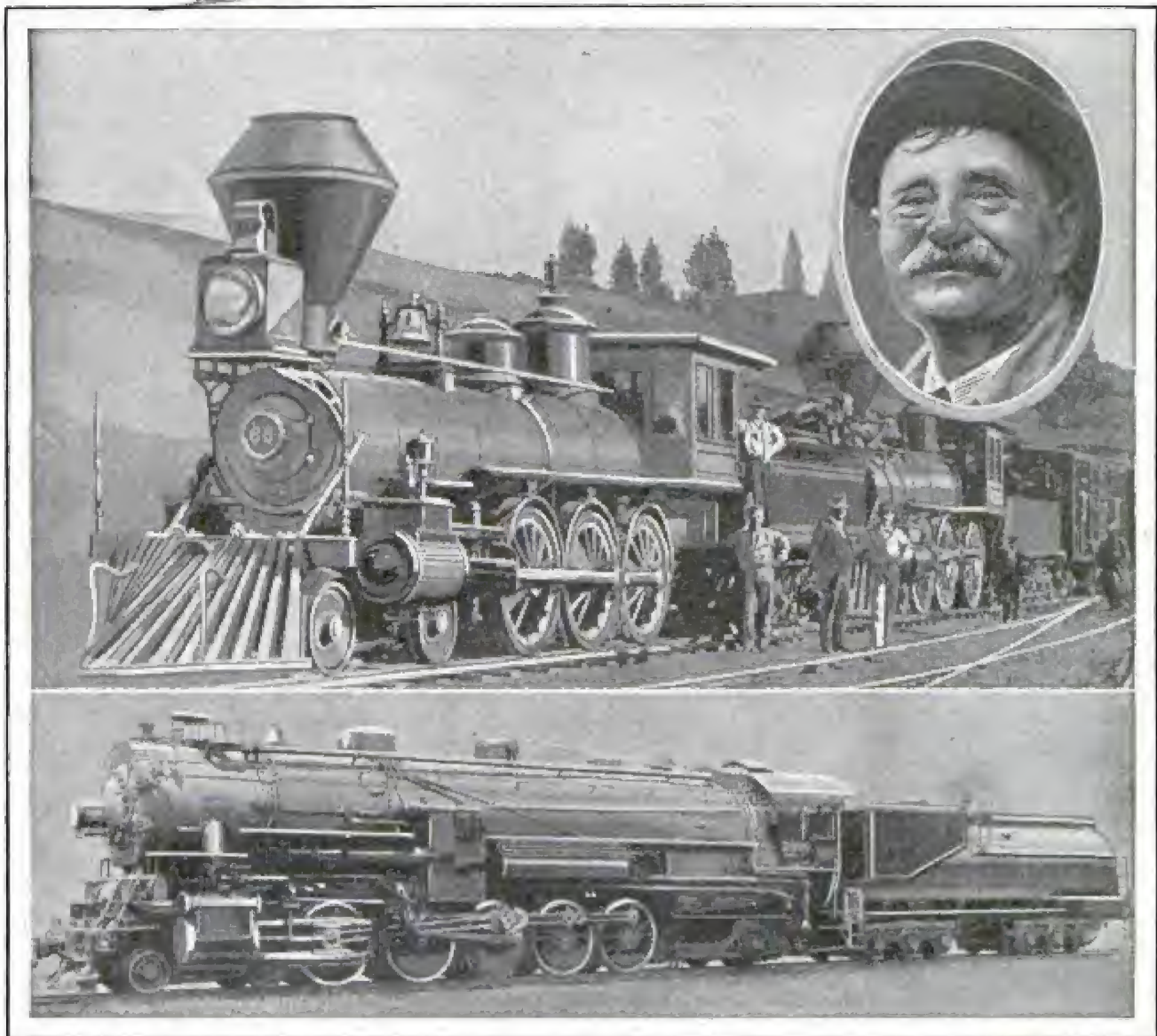
At the crack of a three-inch blank cartridge, a three-seated amphibian plane rose from the deck of a coal barge and soared away in the teeth of a stiff wind over the Potomac river. It was a successful test before government officials of the powder-type launching catapult to shoot airplanes from the decks of warships. A run down the track with engines roaring and the impetus afforded as the cartridge explodes and actuates the gun, send the air cruiser on its way. Success of the apparatus shows that vessels with limited deck space can carry and launch planes with comparative safety, experts declare.

Chicago Tribune 2/29/26



Tongues of Flame Leaping 50,000 to 200,000 Miles above the Sun's Surface; the Small White Dot in the Picture on the Left Gives the Earth's Size for Comparison

HOW LOCOMOTIVES HAVE CHANGED IN FIFTY YEARS



Upper Photo Shows Charles C. Trott, Leaning against Locomotive He Had on His First Run More Than Fifty Years Ago; Below Is One of Type on Which He Finished Service; Inset Is the Engineer

After more than fifty-two years as a locomotive engineer, Charles C. Trott has been retired on a pension. When he started, locomotives with huge smokestacks, and power and speed far below that of the modern giants of the rails, were in use, and during his term of service, said to be a world's record for length, he has witnessed the gradual development of the engine to its present huge proportions and enormous strength.

VASELINE TRAP FOR DIAMONDS PREVENTS LOSS OF GEMS

Vaseline plays an important part in extracting the gems from the soil at the Kimberley mines. After the dirt is taken from the diggings, it is carried to what is called the pulsation house, where it is mixed with water and run over sloping

surfaces to shake away surplus material. These tables are coated with vaseline. The diamonds stick to this substance, but the rubbish, stones, sand and other substances pass over it and are discarded.

RATCHET TOP ON SCREWDRIVER WORKS LIKE WRENCH



Operated at right angles, a reversible ratchet screwdriver is particularly adapted to places difficult of access. The handle is only four inches long and the blade, of tool steel, is removed and placed on the opposite side of the head when the action is to be reversed.

Goodell-Pratt Co.
Presented



Further Development of Extensive Transportation by Automobiles Is Indicated in This Huge Passenger Truck with an Extra Deck at the Rear, Space for Trunks and Broad Windows

SEMI-DOUBLE-DECK MOTOR BUS CARRIES THIRTY PERSONS

Broad, unobstructed windows, an upper deck at the rear and a baggage room in which passengers may carry their trunks, are some of the features of a motor bus introduced in the state of Washington. It will accommodate thirty persons including the driver, weighs 13,900 pounds, and is twenty-nine feet long by nine feet ten inches high. In spite of the upper deck, the center of gravity is low, assuring safety. The coach is heated with hot water and controlled by air brakes. Seats of wicker covered with leather are provided on the lower floor, while chairs on the upper level are of steel, also covered with leather and provided with air pads.

Stresses and strains on his body are outlined on a small strip of film. Lieut. Doolittle has found that a flyer can stand instantaneous movements of the plane without ill effects, but comparatively slower dips and dives, if continued several seconds, sometimes cause him to lose his faculties. In rounding a pylon at high speed, for instance, the blood is driven to the feet. A pilot in the pink of condition can stand this, but about twelve seconds is the limit. The practical service of this instrument, which is called an accelerometer, is believed assured in view of the constant tendency toward higher speeds,

GERMS ON CURRENCY KILLED IN ELECTRIC CABINET

Electrocution is conducted on a large scale in an interesting Chicago laboratory, where a sterilizing and deodorizing cabinet has been devised for paper currency. The bills are placed in a drawer somewhat like that of a filing case, the holder is tightly shut, the current turned on, and, in two minutes, tuberculosis germs and other microbes are killed, according to reports. Furthermore, various odors are said to be entirely removed, and the bills are in no way mutilated. The cabinet has three drawers, and each drawer holds 4,000 bills.



Bills in Drawer Ready for Electric Cleaning

Ster-Electron Corp.

BOUNCE GAUGE AIDS AIRMEN

Instruments have been devised for measuring an airplane's speed, altitude and direction; now comes a gauge for the aviator himself, an intricate little apparatus which shows how his body reacts to the craft's bounces, sudden turns and dips. It is the invention of Lieut. James H. Doolittle of the engineering division of the army air service and is placed under the pilot's seat.

operate between Seattle and Vancouver.

Both in shape of Pacific Northwest Electric Co.

1516

1484

McCook Field Dayton, Ohio.

Chicago

N. La Salle

1006

The Battle of the Ether Waves

THE trials of those who listen in are many, particularly when trying to get radio joys from far-distant stations. A consideration of those influences which arrive from outer space beyond the earth, is of supreme interest, for recently there has occurred a series of coincidences in celestial and radio phenomena that point to a connection between the two. The failure of the transatlantic tests constitutes one of the many mysteries of wireless.

It so happened that an event of great magnitude was taking place 92,000,000 miles away—a terrific outburst on the sun. These solar tornadoes constitute a sort of colossal broadcasting station on the sun for the time being, inasmuch as they pour forth electrons and electromagnetic energy of every kind on a scale beyond conception.

There were two groups of these storm areas, or sunspots. They passed from our view, around to the other side of the sun, at the beginning of

BEAM OF WAVES
CONVEYING ELECTRO-
MAGNETIC ENERGY
THAT WILL MISS
THE EARTH

WAVES OF ELECTRO-
MAGNETISM SHOWN
DIAGRAMMATICALLY AS
EMANATING FROM THE SUN
AND ENVELOPING THE
EARTH. THESE ARE
DEVIATING TO THE
EARTH'S MAGNETIC
POLES

© The Graphic

January, but instead of dying down, as is usual, their energy and violence were such that they continued to increase, until a fortnight later they reappeared around the left side of the sun, large enough to be seen as spots on the disk with the naked eye, through tinted glass. It was during this time that the waves of the transatlantic wireless test concerts were being hurled into the ether with such unfruitful results. That the wireless failure was in consequence of this supersolar eruption, which was one of the greatest that has occurred during the last half century, leaves very little room for doubt when we consider what actually took place on the sun. Both before and during these radio transmissions, the earth's upper atmosphere was being supercharged with free electrons in consequence of the great electromagnetic storm produced by the events taking place in the sun, the aurora being visible proof of this, together with abnormal agitation of the magnetic needle. It is these free electrons that are the bane of wireless. They have many activities, and come from different sources. Normally, the sun's daylight will generate them by



The Sun's Influence on Wireless

1499 ionizing the atoms in the higher regions of our atmosphere. This process consists of depriving each atom of one or more of its electrons, the sun's light having the power to do this. They are, therefore, released during the day in quantities sufficient to absorb part of the energy of the wireless waves that are in course of transmission, very much as the particles in a fog or mist will dim and retard light waves.

That is why day transmission is not so good as night, when the atoms regain largely their full quota of electrons and the atmosphere ceases to be ionized as during the day. Obviously, if there are sufficient of these negative electrons free in the atmosphere, the wireless waves will be exhausted before they reach their normal destination.

The accompanying picture shows a visualization of the electromagnetic association that is known for a fact to exist between the sun and the earth during sun-spot activity. There, at a glance, its effect on our atmosphere, and therefore on radio transmission, may readily be perceived. 1548

1606 MAINTENANCE OF WHITE HOUSE COSTS EIGHT MILLION

Since it was built, the White House has cost the taxpayers approximately \$8,000,000 for care, repairs, refurnishing and rebuilding, according to treasury department figures. This does not include more than \$1,000,000 expended for smaller items.

At present, the structure needs a new roof, which will cost about \$500,000. One of the reasons that so much redecorating and refurnishing is necessary is the wear on the building caused by the hordes of visitors. The first appropriation made by congress for the executive mansion was part of a general fund of \$200,000 in 1796. It was insufficient, and the residence was not fully finished until several years later. The early structure was unpretentious, looking like a giant box. Several years were required for rebuilding it after the British had partly destroyed it by fire in 1814. President Harrison found the White House infested with rats and parts of the floors were removed to rout the rodents. Among articles sold at an auction of old furnishings was a trap Lincoln had used to catch a rat that had ruined his best suit of clothes.

1548 RAISING SILVER FOXES FOR FUR THRIVES IN CALIFORNIA

The success of the silver-fox industry in northern California is laid partly to the climate, which permits the construction of pens best suited to the development of the animals. They are large and open, only two or three foxes being kept in one pen at a time. One of the principal farms of the state is located at the base of Mt. Shasta, where there is ample room and abundant sunlight. Some foxes bring as much as \$1,000 each.



View of Part of California Fox Farm Showing Roomy Pens and Some of the Inmates; Area Is Surrounded by a High Wire Fence to Prevent Escape Even if Foxes Should Leave Pens

RD"
150 7

**SPATS OF RUBBER
PROTECT SHOES
IN KITCHEN**

■ In Argentina, it is planned to manufacture fertilizer from dead locusts.



Cottage Shops on Motor Trucks in Germany; a Strip of Oilcloth with Brick Pattern Suggests Permanent Foundation

cloth with Brick
near Berlin

1526.

*Discovered by three American
Physicians - Genl. J. Christie,
Chas. D. H. St.*

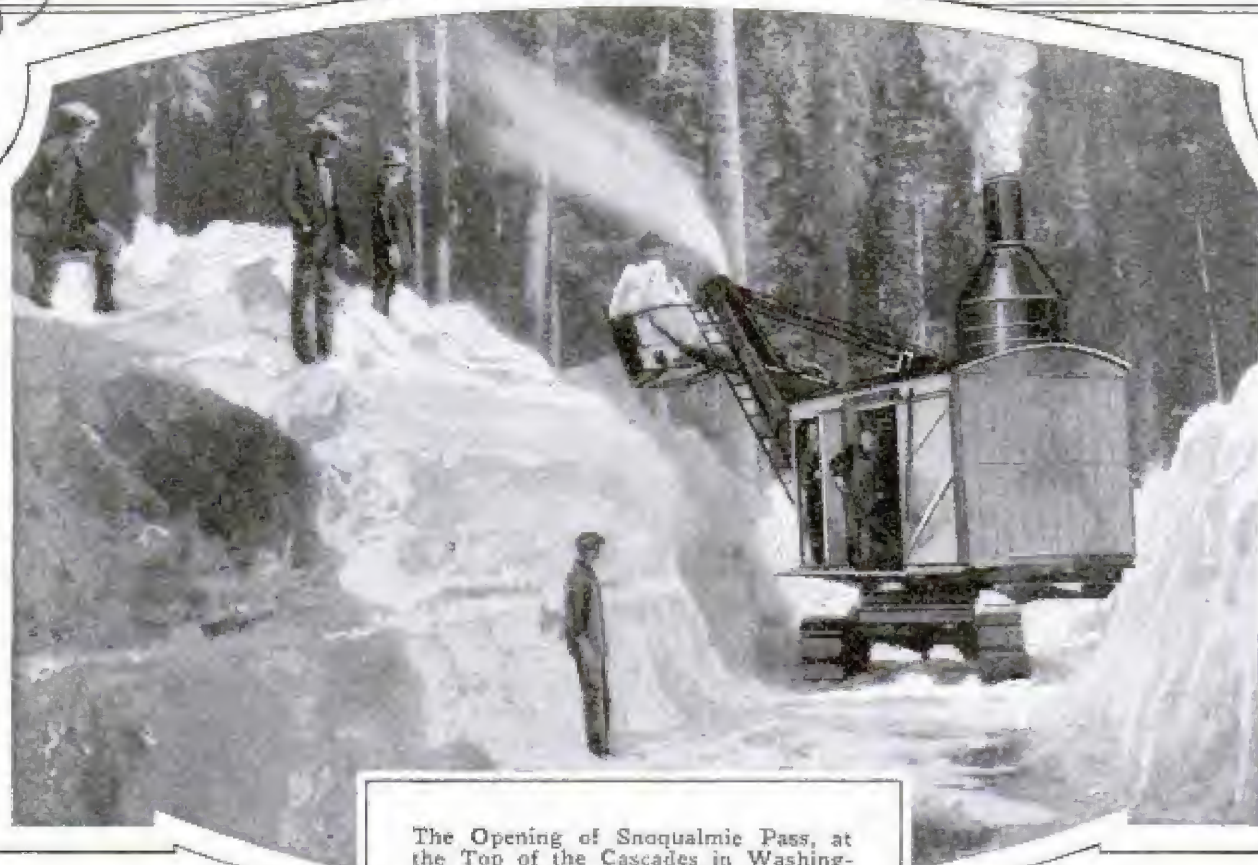
For measuring the heights of mountains, a system developed by three French physicists is said to be eight times as sensitive as a barometer. The process involves heating a wire of high resistance by passing an electric current through it. When a steady temperature has been produced, the wire, if moved upward, will become cooler owing to the lesser density of the surrounding air. The instrument can be carried by climbers, the drop in temperature giving a more accurate index of the increase in altitude than the ordinary pocket aneroid used by mountaineers.



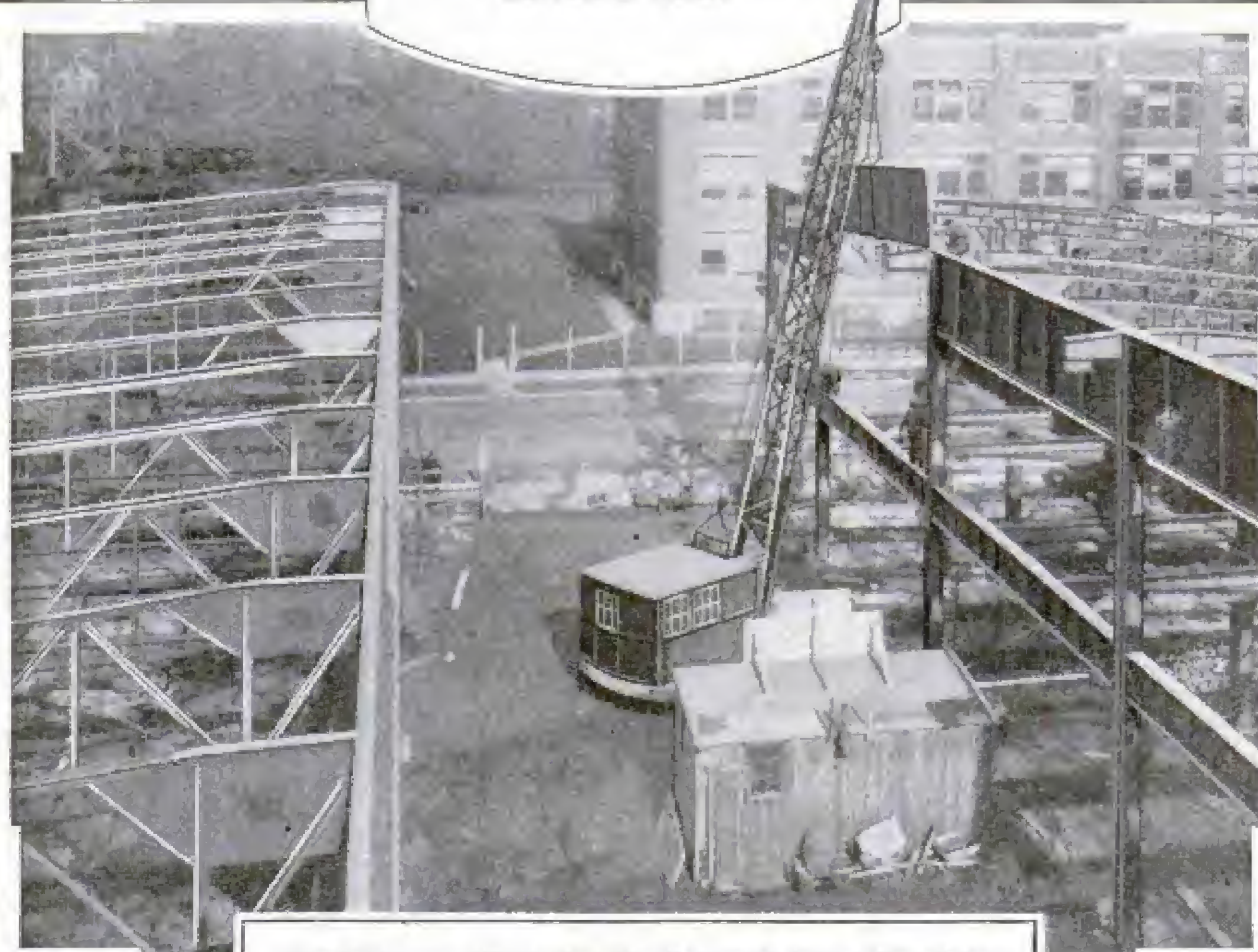
To Protect the Shoes and Stockings When Working in the Kitchen, Rubber Spats Are Easily Adjusted

Alma M. Lassen, 159 W. 85th St

953



The Opening of Snoqualmie Pass, at the Top of the Cascades in Washington, Is a Big Annual Event, as the Sunset Highway Is Snowbound All the Time in Winter



Crawler Crane, Which Can Be Converted into a Drag-Line Shovel, Is Also Useful in Erecting Heavy Steel Framework

Moving Mountains



A Load So Big It Had to Be Broken before Loading onto a Barge; an American Dredge Keeping Gaillard Cut, Panama Canal, Open

Huge Steam Shovels, Manipulated with the Skill of an Artist, Do Everything but Think as They Perform a Nation's Work

A GREAT iron scoop, swaying ponderously on the end of a long steel and wooden beam, dips, with lightning speed and a rattle of chains and gears, into an excavation. The monster behind it snorts and pants, the scoop slides into earth and rock, and with a defiant rat-a-tat-tat of escaping steam, lifts its giant burden high in the air, swings around and dumps the mass into a waiting car. That is the hand of the modern giant at work.

Picture a thousand laborers toiling with pick and shovel and wheelbarrow, a regiment of men toiling all day long at back-breaking work. Beside them place a massive steam engine, the biggest built. The two are equal, for each of the eight gigantic shovels turned out for railroad work in India and the Far East performs

the work of a thousand coolies. A rare novelty only fifty years ago, the steam hand of the giant, in no more than half of a man's lifetime, has dug the Panama canal, moved hills from the path of railroads, excavated the foundations of all the great buildings of America, prepared the roadways used by 17,000,000 motor cars, helped build irrigation dams and canals where land was too dry, and opened

the drainage sluices where swamps were too wet.

To the millions who have gathered around building excavations to watch the big shovels work, their labor-saving power has been overshadowed by the uncanny precision with which the operator manipulates the huge scoop, swaying at the end of its beam like the trunk of some long dead man in a coffin.



Huge Bucket Built for an Electrically Operated Shovel Designed in England for Australian Work

Bucyrus Co, South Milwaukee Wis

Steam Shovel. Bucyrus Co, Milwaukee Wis

Link-Belt Crane

Link-Belt Co, 300 W Pershing Ave, Chicago, Ill



Trench Shovel with a Bucket Holding One Cubic Yard Digging an Eighteen-Foot-Deep Ditch in the West

The skill which puts the shovel through half a dozen different evolutions at once comes as the result of long practice. Two years' apprenticeship as a fireman on the rear end of the shovel platform is necessary before the future engineer can try his hands at the throttles. Then at least a year's practice before the new engineer becomes adept enough to be classed a skilled mechanic. The shovel operator has to do many things at once, and time each to the second and the fraction of a foot. The shovel may be swinging around on its revolving base, the radial arm lowering, the scoop arm drawing back, and the hinged bottom of the bucket closing, to lock automatically—all at one time. The operator so times the process that when the revolving radial arm comes over the work, it has been lowered the right distance and the shovel drawn back the correct amount to be pushed into the earth. The power of the shovel is divided into three parts, one for hoisting, one for revolving and one for push-

ing the shovel into the ground. Hoisting takes the most, sixty per cent, and the other two require twenty per cent each.

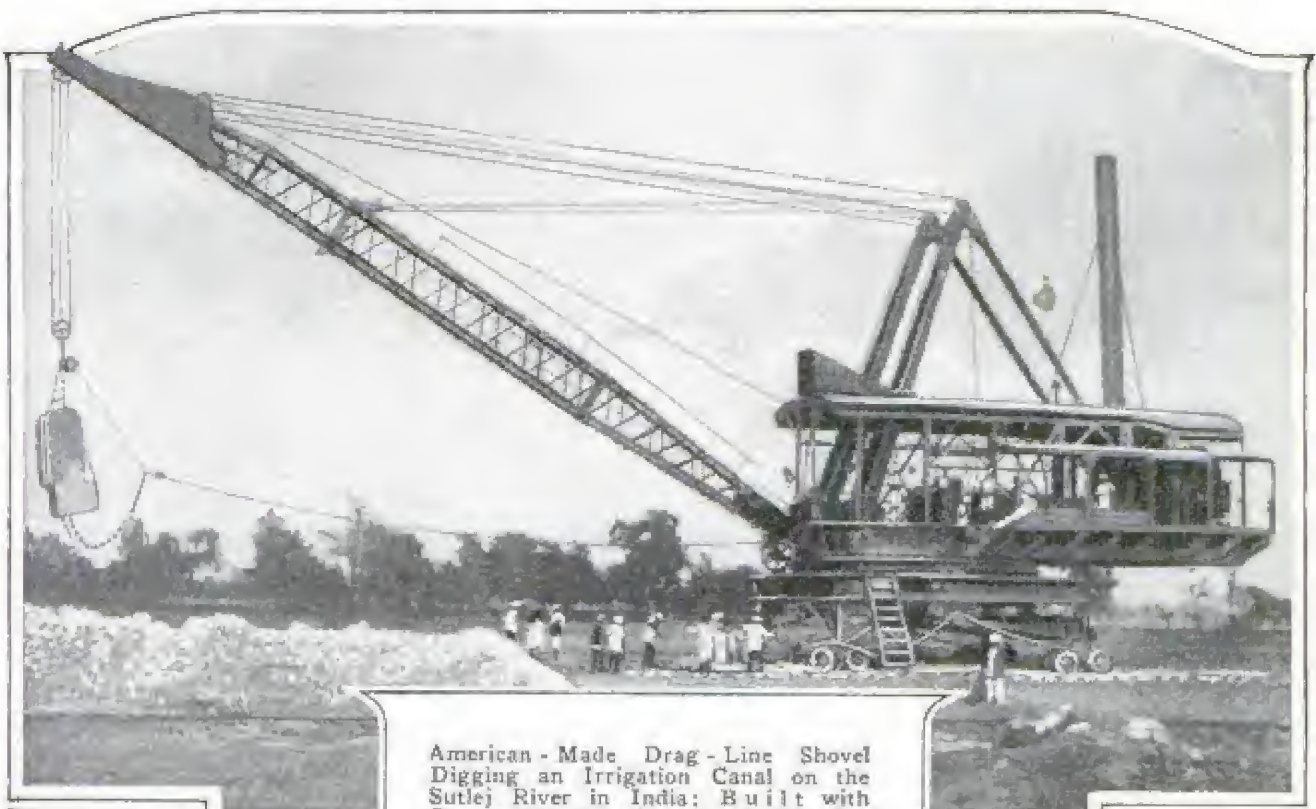
Once loaded, with a carelessly easy swing the hoisting engine lifts its load equal to that of many wheelbarrows, the revolving platform begins to turn, and with the radial arm rising and scoop arm extending, the load is swung over a waiting truck, bottom latch drawn, and with hardly a pause the return movement starts.

Huge rocks or slabs of concrete will be balanced on the very lip of the bucket, held by a single corner, and carelessly swung up and over a truck, edged into place, and the supporting bucket withdrawn. Then, if the slab is too big to drop into the truck body, the operator withdraws the shovel, raises it a bit, extends the arm over the slab, and drops the ton or so of weight, cracking the slab into fragments.

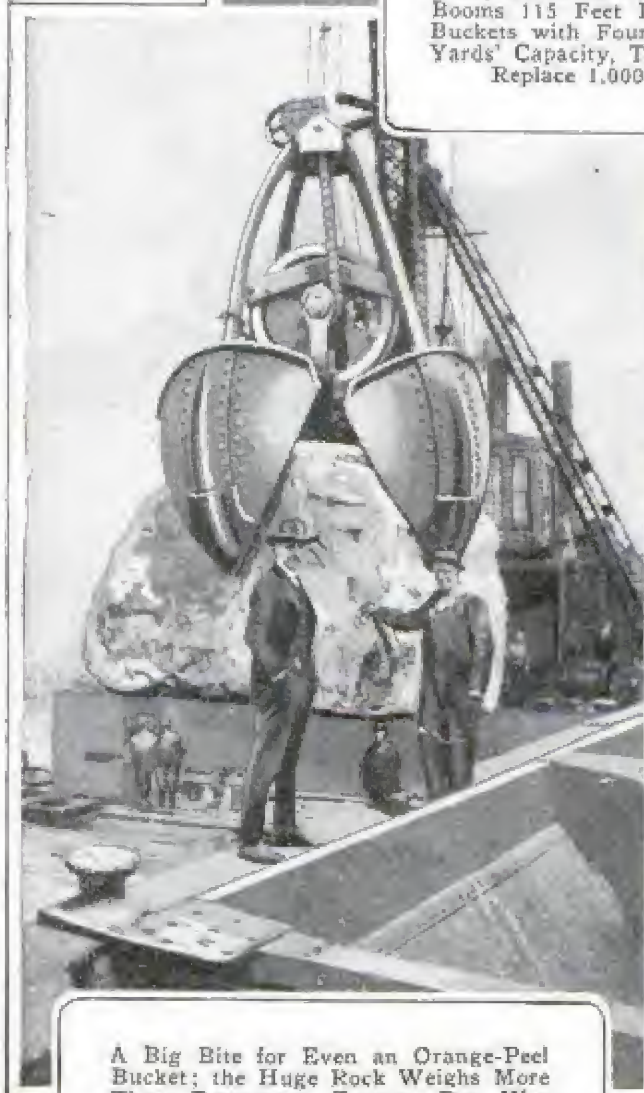
In one excavating job in Chicago recently an ornamental street light stood at the curb beside the most convenient place to stop the trucks for loading.

Time after time the shovel engineer, sitting in the operating cab of the big caterpillar machine far





American - Made Drag - Line Shovel Digging an Irrigation Canal on the Sutlej River in India: Built with Booms 115 Feet Long, and Carrying Buckets with Four and a Half Cubic Yards' Capacity, These Machines May Replace 1,000 Men or More



A Big Bite for Even an Orange-Peel Bucket; the Huge Rock Weighs More Than Twenty Tons, But Was Wrenched from the River Bottom by Steel and Steam without Difficulty



Straddling the Trench on a Special Mounting, This Big Shovel First Digs the Ditch, Then Lowers the Seven-Ton Sections of Seven-and-a-Half-Foot Pipe in Place, and Finally Returns the Dirt



Shovel Ripping Up Asphalt Pavement and Concrete Base, Top; Doing Railroad Excavation Work, Center; and with an Unusual Load, Which Must Be Carefully Maneuvered into the Truck, Below

down in the basement, lifted a load of earth or cement, swung it over the big glass globe of the street light, missing the fragile ball never by more than four or five inches, dumped the load into the truck, gave the shovel arm a sudden flip that sent the hanging bottom gate swinging shut, so the latch would hold it clear of the light, and swung back for another load, all without waste motion or pause to calculate clearance. On another occasion traffic was blocked by hundreds of rush-hour pedestrians who paused to watch a big caterpillar shovel back up a wooden ramp over a sidewalk and down into the cellar of a building being wrecked. The power revolving the caterpillar tread was insufficient to lift the mass up the ramp, so the engineer lowered the shovel to the pavement, turned the steam on the shovel arm, and, pushing it out full length, forced the pon-

derous machine backward up the incline. The steam shovel is an American invention, dating back almost as far as the railroad, but it came before its time. Hand labor was still too cheap to leave any demand for mechanical power, so William Otis, of Boston, who built the machine in 1839, failed to realize on his creation. His original shovel, however, embraced practically every feature of modern machines, and even the name, which has stuck, in this country at least. Nobody else produced a steam shovel until 1875,

when an English firm brought out the first one of steel construction, and one of their first machines, built in the following year, is still excavating clay at a brick plant at Newcastle. The steam shovel, after the sanitation work of General Gorgas, made the digging of the Panama canal possible. It is doubtful whether enough hand labor could have been maintained in the tropics to ever have dug the giant ditch by human labor. With the growth of big building projects in recent years, shovels of many designs have been built, with vari-



ous types of buckets, but the kind commonly used for building construction remains the true steam shovel, duplicating the movements of a laborer at work.

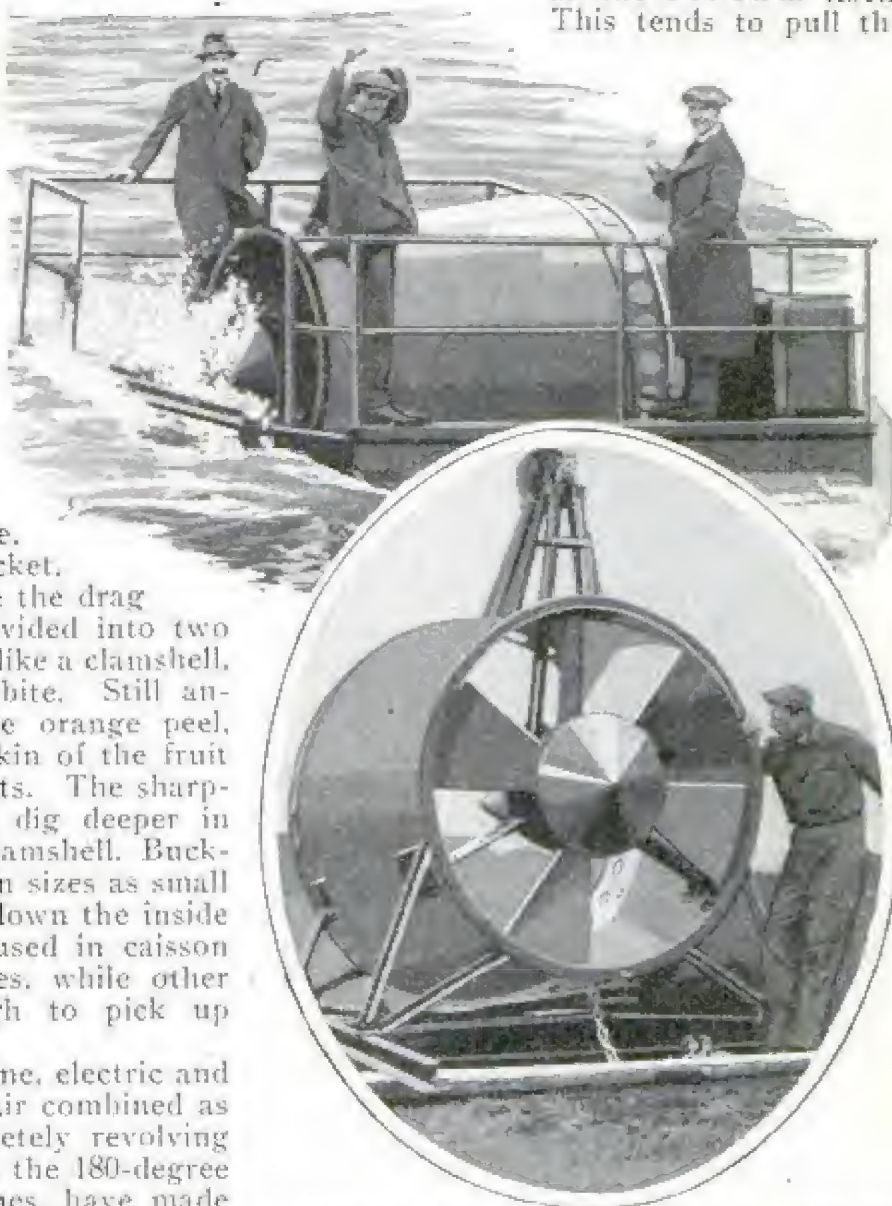
For dredging and work in soft ground the drag-line excavator has been created. It has a long boom, often sixty feet or more, supporting a box-like bucket which can be swung far out from the machine and then dragged across the bottom and finally lifted. The action is just the reverse of the true steam shovel, which performs its toil above the level of the machine, while the drag line works from the top down. A third type, the clamshell or grab bucket, operates from a boom like the drag line, but the bucket is divided into two parts, opening and closing like a clamshell, grabbing a load at each bite. Still another type of bucket, the orange peel, takes its name from the skin of the fruit when split back in segments. The sharply pointed segments will dig deeper in harder material than the clamshell. Buckets of this type are made in sizes as small as eleven inches, to drop down the inside of the twelve-inch pipes used in caisson building for big structures, while other buckets are large enough to pick up twenty-ton boulders.

Caterpillar treads, gasoline, electric and gasoline and compressed air combined as motive power, and completely revolving superstructures, instead of the 180-degree radius of old-time machines, have made important changes in the shovels of recent years, but the basic idea remains the same as that of the first shovel designed by Otis.

WATER WHEEL LIKE WINDMILL PROMISES CHEAPER POWER

Operating on the same principle as a windmill, a turbine devised by a foreign engineer is intended to generate electricity from flowing water without the necessity of constructing dams, powerhouses or lengthy conduction lines. The apparatus rests upon floats and can be towed and moored to any convenient place where there is sufficient depth and current to run it. The turbine is inclosed in a conical metal case, with the narrow end pointing upstream and the larger perforated with a number of holes. There are four

propeller blades. As the water enters the mouth of the case, its velocity is naturally reduced when it flows to the larger end, but the water outside has the same speed as the stream itself. This tends to pull the



Turbine on Float Ready for Placement in Current and a Close View of the Wheel

water through the turbine vessel with the effect that when it leaves the case, the water has the same velocity as the open river, provided that all dimensions of the various parts of the apparatus are correctly proportioned. The dynamo is turned by a sprocket chain in a watertight case. The inventor has calculated that a turbine four and three-tenths feet in diameter at the smaller end and six and one-half feet at the larger should give fifteen horsepower from a stream flowing at six miles an hour. The apparatus is so arranged that floating material is not likely to clog the turbine. To generate power, it must be fully submerged so that water flows over the upper rim of the downstream end of the case.

Austria

and Mrs. J. S. ... and Mrs. W. ...

BLOWER FOR TRAFFIC WHISTLE EASES POLICEMAN'S TASK

1547 Traffic policemen stationed at a square in an eastern city objected to the task of having to blow their whistles so loudly that they could be heard in all parts of the area. An ingenious member of the force solved the difficulty by means of

Policeman on Pedestal with Whistle Plunger in Left Hand; Sound Is Carried to All Parts of Square



a hand-power blower. A push of a plunger sounded the whistle even more distinctly than was possible by the usual method. The apparatus was placed on the policeman's platform.

FAKE DIAMONDS ARE DETECTED BY FIVE-WAY TEST

1575 Imitation gems have increased to such an extent during the last few years that experts seldom rely on one examination to determine their character, but resort to

a five-way test. The steps are simple and a practiced person can perform them in ten minutes. The first is the inspection of the facets. To do this, a genuine stone is compared with the one being studied, and it is generally found that the fake has facets more accurate than those of the real one, because the manufacturers take extra care with the grinding and polishing of the imitation gem. In the brilliancy test, which follows, a gem that is faked is found to have less sparkle than a real one. This is determined by dropping the stone under suspicion into a bowl of water. If it is a natural gem, it will glisten through the liquid, but an imitation diamond loses its flash. The third step is known as the globule test. A drop of water is placed upon the gem's face and is then touched with the point of a sharp pencil. If the stone is genuine, the drop of water keeps its form while on the faked one, the globule is broken up and spreads. Next is the dot method. This consists in looking through the stone at a black spot on a piece of paper or other white surface. If the dot appears in any way blurred, the stone is held out for further tests. The final and most conclusive part of the ordeal is the marking test. In diamonds, the degree of hardness counts for much. A file will run smoothly over a genuine stone and leave no trace, but the best of imitations fail here, for they cannot stand the treatment without being marred.

PRESS TO SET AUTO WHEELS REDUCES WEAR

1504 For tightening spokes in automobile wheels with steel felloes, a press that can be bolted to a post or solid wall, simplifies the task of eliminating the squeak that loose units produce, and the excessive wear and danger attendant upon such conditions. It takes up the shrinkage which has been caused by drying, by properly depressing the rim with a special die manipulated by a lever. The press can also be used for removing bushings, and other similar work.



Ⓢ Paper yarn from wood pulp is now being woven into carpets and rugs of different colors. They can be washed.

Patented Sept. 5, 1922. #1429303
Calif. Sacramento
Calif. Corralito
Hamilton 689

Crab. Laid. Hadden. Eng.
11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



Does Your Hair Reveal Your Character?

Whorls, Patterns and Distribution Studied by Science Form an Accurate Check on Personal Characteristics

By DR. ARTHUR SELWYN BROWN, 30 W. 75 St. New York

BARELY a century ago, human hair, on account of its physical qualities, was largely used for scientific and artistic purposes. Makers of scientific instruments employed hair for the angle markers in telescopes, surveyors' levels, clinometers and other apparatus. Its strength permitted them to use it for suspending fine pendulums and similar moving parts. Its remarkable property of absorbing moisture made it valuable for hygrometers and for numerous other purposes. When the metallurgy of alloys was developed, about fifty years ago, numerous steel alloys were discovered that may be used for drawing into very fine wires. These convenient alloys led instrument makers to select them in place of hair.

The artistic uses of hair were as numerous as the mechanical and scientific. Nearly everyone has seen the old-fashioned pictures and lockets in which human hair, such as the golden hairs of children and the silver hairs of old people, was plaited or woven into many patterns and forms. In the museums in Europe we may see how dyed hair was formed into pictures like tapestries and made into

many artistic fabrics. But those are lost arts, that may never be revived.

There remains a commercial demand for human hair for theatrical wigs and similar purposes. The chief markets for this hair are in Palermo, Berlin, Paris and London. The prevailing custom of bobbing the hair has caused merchants to look more to Asia for their supplies and has caused the price of good samples to rise to record figures. These prices may in the near future cause users to find substitutes for it and then we shall see the end of commerce in human hair.

The bobbed-hair craze has raised many questions about social conditions. May it not be used as an occasion for inquiring into the importance of hair and to study this interesting problem on other grounds?

Hair is distributed all over the human body, except the palms of the hands, the soles of the feet, the lips and the eyelids. Its thickness varies in accordance with the part of the body it is growing on. The head, face and chest have the thickest and longest growth. There are about 1,200 hairs per square inch on the top of the head of a middle-aged man, and 160 per

square inch on the face. There is less than half this quantity on the chest. Race, sex, age, condition of health, habits and climatic changes all influence the thickness and growth of the hair.

A woman, with black hair has about 600 hairs per square inch on the top of the head, while a blonde has 760 per square inch, and a brown-haired person has about 650 hairs per square inch. A black-haired person usually has the thickest hair and a blonde the finest. The total number of hairs on the head of any ordinary black-haired woman is about 110,000, while a blonde has 150,000, and a red-haired woman only 30,000. A woman's hair is coarser and heavier than a man's, and it grows longer. The average length of hair of women of the Anglo-Saxon race is from eighteen to thirty inches, and that of men between six and ten inches. Men's hair will seldom grow as long as women's.

The average speed of hair growth is two inches per month. The period of growth of the hair on the head is about six years, and the eyelashes have a life of about 130 days. After these periods, the hairs wilt and fall out. Hairs grow just as new cells replace the dried cells of the skin that wither and fall off like scales.

The hair is a very acute sensory organ and assists the brain and other organs to discharge their surplus energies. In animals, certain hairs are developed into exceedingly alert and sensitive sense organs. It is a peculiar growth of the epidermis or skin. In this respect it resembles the nails, the horns of cattle, the feathers of birds, the quills of the porcupine, the scales of butterflies, moths and fish and the shell of the tortoise.

Hair is easily colored and, in nature, the pigments it contains are peculiar to the

species. The duration of its pigmentation in life is limited. In man, we may, in a brief period, witness a child having a bright golden hair, which soon changes to a dark black and then to a gray or silver-white and dies at maturity and falls out, leaving baldness. In the animal kingdom, we may notice similar changes in the pigmentation and also many abnormalities in its life, particularly in those animals which periodically molt and shed their hair.

Scientists believe that hair has a high value as a racial characteristic. The microscope discovers that the structure of hair has multiform variations and these may be clearly defined and utilized for personal and racial determinants, like finger and other skin prints. Common observation shows that the texture and form of the hair of a Negro, Chinaman, American Indian and a Caucasian differ in quantity, color, structure and growing habits. All through the animal kingdom we may find similar differences in all the species. A man's race, nationality, character and the condition of his health may be shown by a microscopic investigation of one individual hair.

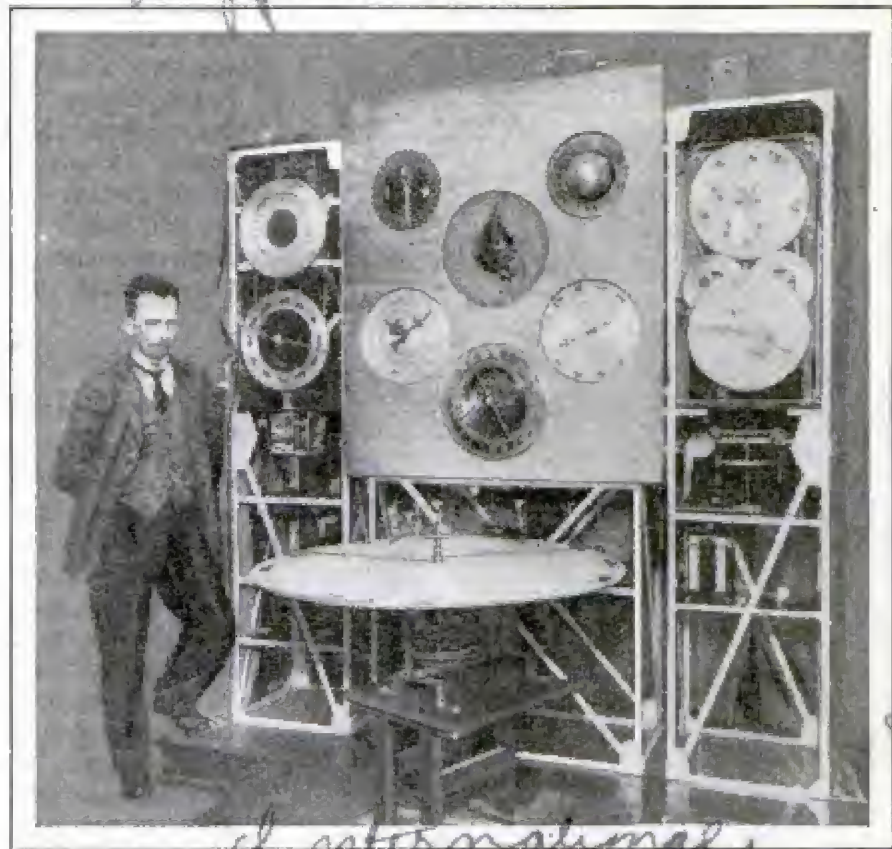
Examine the hair on your forearm, your eyebrows and your head, and you will see that it is all growing in different wavy patterns. The arrangement in your eyebrows, for example, will differ from that of many of your friends. Study the patterns of eyebrows a little and see how closely they are associated with personal characteristics and peculiarities. See how the graceful, flowing patterns of the eyebrows of an artist strongly contrast with the irregular arrangements seen in bad-tempered and miserly individuals. You may even learn to read character by the hair patterns of eyebrows or head.



These South Sea Islanders, with the Bushmen of Australia, Hold the Record of the World's Most Hairy People; Color, Thickness, Structure, Curliness, All Differ with Place and Race

ELECTRIC AUCTION IS NOISELESS

Egg auctions are being successfully conducted with the aid of electricity in Holland, and the method has worked so well that it is proposed for adoption in other sales. Bidders occupy numbered chairs fitted with push buttons wired to a big dial on the auctioneer's platform. This dial shows numbers representing prices from the lowest to the highest amounts. When the sale starts, the auctioneer briefly describes the eggs, which are sold in lots of 2,500, a bell rings and the dial hand starts to move from the highest to the lowest sum. If it passes a figure acceptable to a purchaser, he presses the button on his chair, the hand halts, a panel is illuminated with a number corresponding to that of the bidder's chair, a bell rings and the sale is closed. Thus the highest bid has been made without shouting or confusion, and there is no doubt as to the person who made the offer.



German Inventor and His Clock of Many Dials Which Show Time in Various Parts of World and Star Movements.

ODD CLOCK WITH TWELVE DIALS SHOWS MOVEMENTS OF STARS

Consisting of eighteen sets of works and 468 wheels, an astronomical clock constructed by a German is said to surpass the famous piece in the Strasburg cathedral. It indicates the movements of the stars, the time in different parts of the world, positions of the sun and moon and their eclipses. A perpetual calendar for 15,000 years and one that shows the church festivals are also provided. Spring is denoted by the cry of a cuckoo, and summer by the whistle of a quail. At noon, the twelve apostles pass in review while a cock crows.

SHOE CLAMPED ON AUTO TIRE HELPS CAR OUT OF MUD

When extra traction is needed, to help get the automobile truck or pleasure car out of the mud, a pressed-steel lug that can be slipped on or off in a few seconds is found useful. It snaps shut over the tire, holds tightly and is equally efficient in mud, sand or snow. Carried in the tool kit, it occupies only a very small space.



Can be used on deck wheels.

¶ We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

SUNFLOWER FIBER AS STRAW IN PANAMA HATS

Light in weight, flexible and airy, a material made from the fiber of sunflower stalks has been developed by an English inventor as a substitute for straw in weaving hats. Young shoots of uniform age are chosen, and after the fiber is removed, it is dried in the sun to shrink, toughen and bleach it. The material is then wrapped in clean cloths to protect it from light and dry atmosphere. Besides being cheaper than Panama straw, the sunflower fiber is said to be more easily worked.

Chicago Tire Tug Co. 336 W. 4th St. Chicago

Berlin, Germany
Schultz
Creswell
and George Holders



Cigarette
Vender, Show-
ing Coin Slots and
Package Compartments

COIN-IN-SLOT CIGARET VENDER RETURNS CORRECT CHANGE

Ten different brands of cigarettes are supplied from a coin-in-the-slot machine which also returns the correct change. Both the merchandise and the money are securely protected within the case, and it holds a large supply, making frequent replenishing unnecessary.

RAIL HEADS GUARD PRESIDENT ON TRAIN TRIPS

Railroad routine is reversed and the highest executives of the lines take charge when the president travels in special trains. So elaborate were the precautions taken when President Coolidge went to Vermont at the time of the death of his father, that a telegram notifying the chief executive of the passing of Col. Coolidge was intercepted by a railroad policeman who tore it up, acting on instructions that no contact of any kind should be made with the train. The contents of the dispatch was told to the president verbally. A special pilot train is often sent ahead of the president's to clear the tracks, block signals are examined before the trip, and picked crews are selected both for the pilot train and the executive special. Rail-

road police are aboard the train. Relief locomotives were stationed along the way on the Vermont trip with steam up and ready for service in case anything should happen to the engine on the presidential train. Railroad executives keep in constant touch with the special while it is in transit, and all engagements are canceled. Between the passage of the pilot train and the special, all traffic is suspended.

THIRTY RIFLE SHOTS A MINUTE WITHOUT OVERHEATING

Lighter, simpler and more rapid in operation, a semiautomatic rifle designed for army use was given a successful demonstration by experts recently. It fired about two well-aimed shots to every one practical from guns of the present type, and there was no overheating. The gun is of .276 caliber, and one of its chief features is the breach mechanism. Instead of being a rigid unit, it is constructed in three major parts that operate somewhat like the human arm under similar conditions. For instance, when the cartridge explodes, the breach is straight and locked until the thrust is overcome; then it begins to contract and bends upward, the forward part simulating the movement of the hand in withdrawing the empty shell. The cartridges are carried in clips so designed as to hold ten in a double-row arrangement. The empty clip is ejected from the rifle



Side View of Fast-Firing Rifle and Clips of Cartridges
Note the Cooling "Fins" on Barrel

along with the last fired case. The barrel is about the same length as that of the ordinary service rifle, but has a number of "fins" along the rear half to assist in cooling. The rifle is to be adapted to the 1917-style of bayonet.

New York Herald

June 3/20/26

Mass
Spring field.
J. Edgar
Arsenal,
et al.

ONE-HUNDRED-POUND TAX BOOK OVER EIGHT FEET LONG

Specially large equipment was required in the construction of a gigantic tax ledger for an Oregon county. The book

locate the quarter of the city from which the unknown transmitter

Huge Tax Ledger for an Oregon County Which Took Several Men a Month to Complete



is eight and a half feet long, weighs 105 pounds and contains 760 pages. Several workmen spent a month in completing it.

NOVEL RADIO SLEUTH PROTECTS PEACE OF PARIS

As an aid to the French military and police authorities in finding unlicensed radio transmitters, an improved detecting instrument is reported successful even in locating the source of short waves which set up an unstable magnetic field. The former apparatus used, the radiogoniometer, which indicated the direction from which radio waves were coming by a sharp sound in a pair of earphones, due to radiations from the transmitter, proved ineffective in hunting the outlaw short-wave sets, which were becoming a nuisance in Paris. An improvement, therefore, was developed by a French radio engineer. It is known as the microradiogoniometer and supplements the former instrument. It consists, in part, of a series of screens adjustable in all directions and angles relative to the horizon and zenith, and locates the direction, not merely of short, average and greater wavelengths, but of eddies of frequently reflected waves whose line of travel is hardest to find. Three radio observation posts are established to

is operating. Paris recently has been surrounded by these observation posts for police and military purposes. As soon as a suspected transmitter is heard in a given area of the city, by one of the three posts, the other two are notified to find the unknown's direction and the wavelength being used. The three posts then set to work to plot three lines which should, in theory, intersect at a point exactly marking the locality of the unknown transmitter. In practice, however, the intersecting lines form a little triangle bounding a block of houses. An automobile, closely resembling an ordinary business or pleasure car, then sets out to the area marked out on the plan of the city. The autoist carries a portable instrument case containing batteries and wires and mounted on a graduated plate revolving on ball bearings. This is the microradiogoniometer. It has no antenna or other frame.

When the car has reached the suspected location, it is stopped at a point close to one of the corners of the triangle. The autoist turns the "micro-rad" and plots a line on a large map of the district. He takes two other observations at two other points which he also marks on the map, and the three lines intersect at a point which represents the house or site of the concealed radio transmitter. The police do the rest.



Courtesy La Science et La Vie
Radio Sleuth Car in Action; after Preliminary Surveys, the Instrument Points to Offending Transmitter

M. Izny du Bourg de Bozas.

Cont. of The Savagur.
942 Washington, D. C.

**FIRST IDEA FOR MOVIE PICTURE
GAINED FROM SPINNING COIN**

1620 Do the movies owe their origin to a shilling spinning on top of a table? Something over a century ago, Sir John Herschel asked his friend Charles Babbage whether he could show both sides of a shilling at once. Babbage replied by taking one from his pocket and holding it in front of a mirror. Sir John was not satisfied and set the shilling spinning on a large table. At the same time, he explained that if the eye were placed on a level with the coin, both sides of the shilling could be seen at once. Babbage was so impressed with the experiment that the next day he described it to his friend Dr. Fitton, who immediately made a working model. It was a cardboard disk with the picture of a bird on one side and of an empty cage on the other. When the card was whirled on a silk thread, the bird appeared to be inside the cage. The model, called a thaumatrope, showed that the eye retains the image of an object for a fraction of a second after

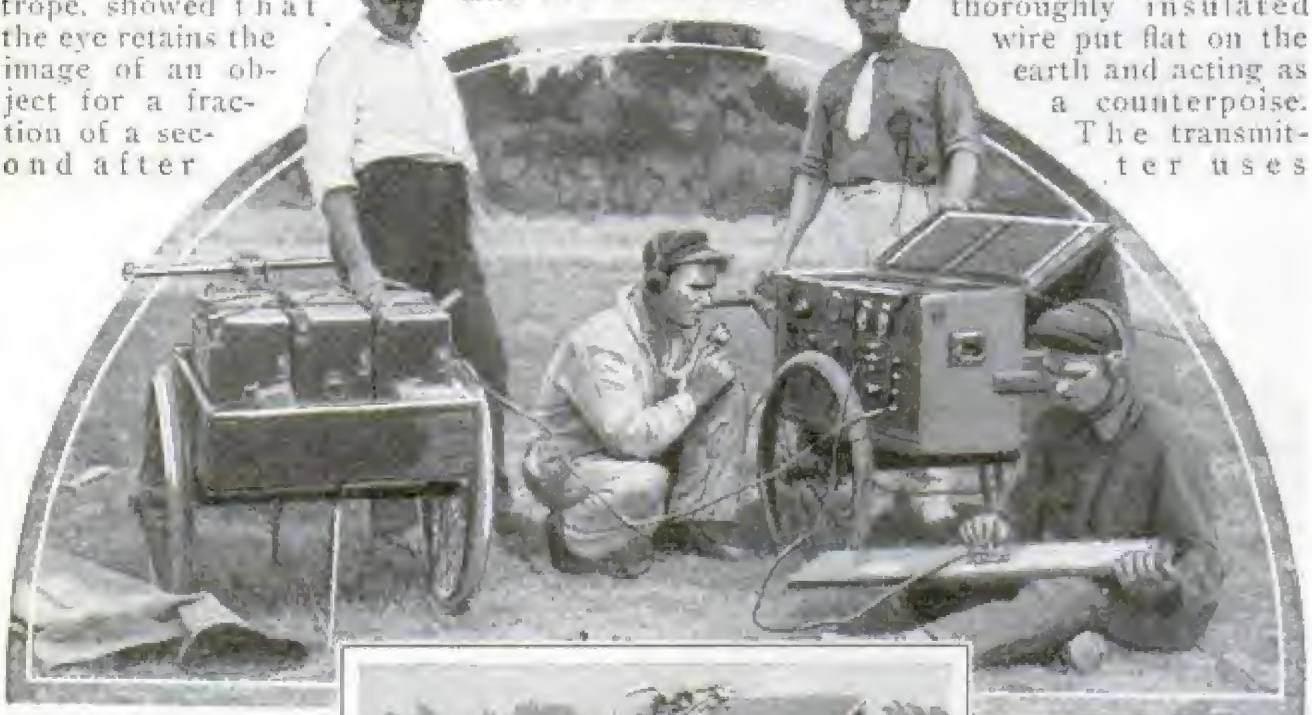
rotated, the figures seen through the slots appeared to be in motion. About 1872, Edward Muybridge made the first systematic photographs of men and animals with a view to showing them in motion.

Transmitter
**RADIO AND TELEGRAPH IN ONE
TO AID ARMY MOVES**

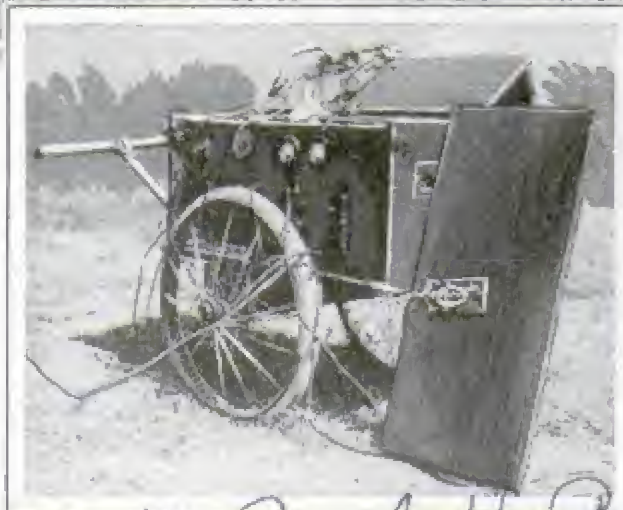
1494 Radio telegraph and telephone have been combined in a compact unit intended especially for the use of infantry divisions under battle conditions. It is portable, the set itself being carried in a small two-wheeled rubber-tired cart and the batteries in a similar arrangement. The outfit has a telegraph range of sixty miles, a buzzer range of thirty miles, and the radiophone can be used within a radius of twenty miles, more than ample for the usual needs of a battle front. The apparatus uses a single-wire aerial, 150 feet long and strung between five-foot stakes, serving for both transmission

and reception. The ground consists of a thoroughly insulated wire put flat on the earth and acting as a counterpoise. The transmitter uses

Battery Cart and Set Connected during Field Test; Detailed View of Outfit Below



the object has been removed. Following the thaumatrope came the zoetrope, or "wheel of life." A cylinder was perforated with a series of slots and a band of drawings of dancing men was placed inside of it. When the apparatus was



three fifty-watt tubes and the receiver three of five-watt capacity. The set can be tuned sharply. It was developed in the radio laboratory at Fort Sam Houston, Tex., from a set used for communication between artillery units and airplanes.

Cont. Royal H. Counsel
2215 Broadway

BATTLE OF CROWS AND HERONS LIKE AIRPLANE FIGHT

Thrilling air battles between flocks of crows and young herons caused witnesses in England to note the similarity between the tactics used by the birds and those of aviators in airplane engagements. The herons assumed the offensive and, by climbing upward in spirals or suddenly darting, endeavored to gain favorable positions. They inflicted considerable damage by turning their heads and thrusting their beaks through the feathers of their enemies, impaling them. But the advantages were with the crows because of their greater dexterity with wings and higher speed. They seemed to know how to make the best of an unfavorable position and sometimes feigned a feeble state to lure their opponents to the attack. The young herons usually were compelled to return to their grounds in Richmond park, and as they flew back defeated to the tree tops, they made noises like those of a puppy forcibly ejected from a room, while the victorious crows gave out sonorous cries expressive of pride.



Looking Forward on Deck of Giant Submarine "V-1" Gives Hint as to Length of the Huge Diver and Speed It Develops

LATEST "SUB" SURVIVES TEST TWO HUNDRED FEET DOWN

Submerged to a depth of 200 feet, the submarine "V-1," lately added to the United States navy, underwent successful tests off the Connecticut coast. This giant diver is more than 340 feet long, twenty-seven and one-half feet wide and carries eighty-four men and seven officers. In addition to its six torpedo guns, the craft is equipped with one five-inch rifle for use in defensive or offensive action above the water.

METAL CORNERS FOR SCREENS SIMPLIFY BUILDING

Construction of window and door screens, frames and similar articles is simplified by using ready-made metal corners now on the market. They eliminate gluing, mortising and dowel pins, and in addition strengthen the work and protect it against damage. The metal incloses the corner completely, and when perforations for nails or screws are lined up, the corner is certain to be at right angles.



LIVE CLAMS AS MOUSETRAPS RID CELLARS OF PESTS

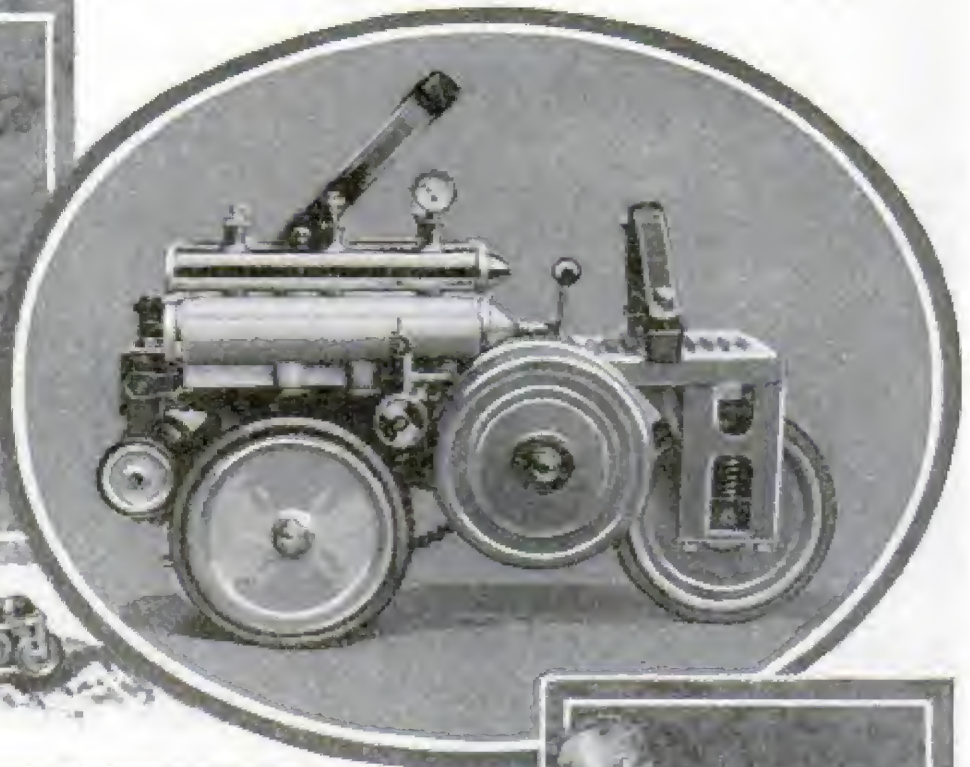
Keeping a basket of live clams in her cellar one night led a Maine woman to an interesting discovery. The next morning she found three dead mice held tight and fast between the shells of as many clams. The news was relayed to her neighbors, who tried the method with equally satisfactory results.

William James (12th St.) Toledo, Ohio
 227

William James
 227

Mrs. E. W. Creamer
 Cushing, Maine

1490



Roller Skates-like Tiny Individual Motor Cars Are Propelled by Acetylene Gas; Controls Manipulated by the Cords within Easy Reach While Both Grades and Rough Ground Are Traveled

MOTOR USES ACETYLENE GAS INSTEAD OF GASOLINE

Miniature combustion engines devised by a German inventor use acetylene gas, permitting great efficiency with extreme lightness and compactness. The motors are not toys. They already have been adapted to roller skates, a small airplane in which the pilot reclines, and to a tiny automobile with automatic lubrication, water-cooling and ventilator fans. The car is said to have averaged nearly twenty miles an hour at a cost of about three cents. An extra supply of gas can be car-

ried in cartridges. The airplane can be folded up, weighs only 132 pounds and costs, complete with motor, not much more than a motorcycle of good grade.

HOT BRINE FOR REMOVING SNOW REDUCES TRAFFIC DELAY

Within twenty-four hours after fourteen inches of snow had fallen upon the tracks of an eastern street-car company, the line was open to travel, although sweepers, plows, men with shovels and other snow-fighting equipment played a minor part in the accomplishment. The

Used by Cumberland
Trust Co.

first light flakes were brushed off with little trouble, but the snow drifted back and became packed. Motor trucks were borrowed and filled with a boiling mixture of salt and water. This was poured upon the tracks through pipes from the trucks and was churned up by many automobiles passing over the thoroughfare. In half an hour, the rails were again visible. Officials estimated that the brine had saved the company twenty-four hours of idleness.

DISK TO INTERPRET LANGUAGES FOR TRAVELERS *H59*

Persons traveling abroad and not familiar with the languages are helped in many situations by a small pocket interpreter. It is in the form of revolving disks with the English phrases commonly used on one, and the foreign equivalent on the other. By setting the indicator at the proper section of the first and turning the other, the translation appears through a slot on the reverse side. The arrangement is always ready for use, and since it gives whole phrases instead of single words, is more helpful than a dictionary.

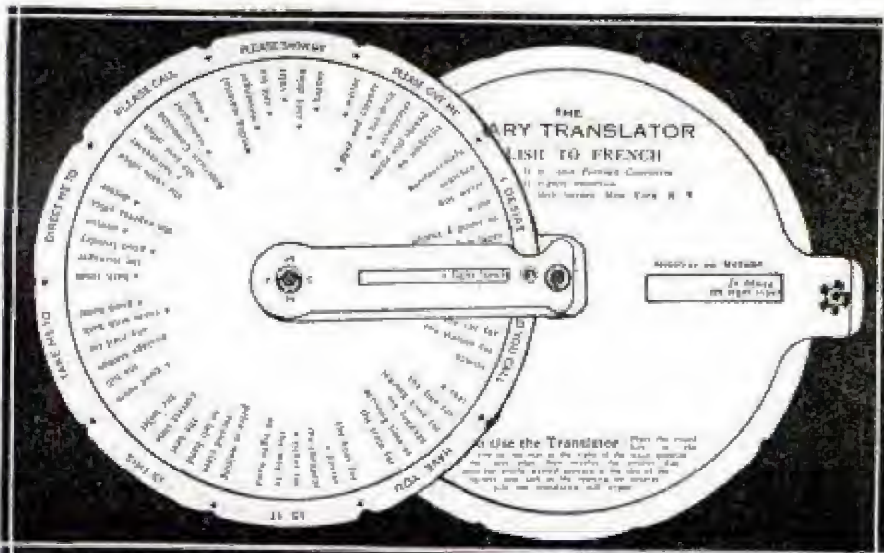


Guardians of the Beacons Lowering a Cleaned Lamp to a Light Buoy; Danger of Collisions Adds to Hazards

CHANGING LIGHT-BUOY LAMPS PERILOUS SEA TASK *1514*

Back of the "lights that never fail," shining to warn mariners of the perils lurking in dangerous reefs and coasts, are countless deeds of human courage and daring. Many of these are enacted, in the course of a day's work, by the men who change the lamps in the ship buoys. They must keep the beacons cleaned, filled with oil, and replace old ones with new. To perform their tasks they often are required to brave rough weather and must venture into the midst of the dangerous shallows.

❑ In Japan is a species of spider crab with long claws that sometimes measure thirty inches from tip to tip.

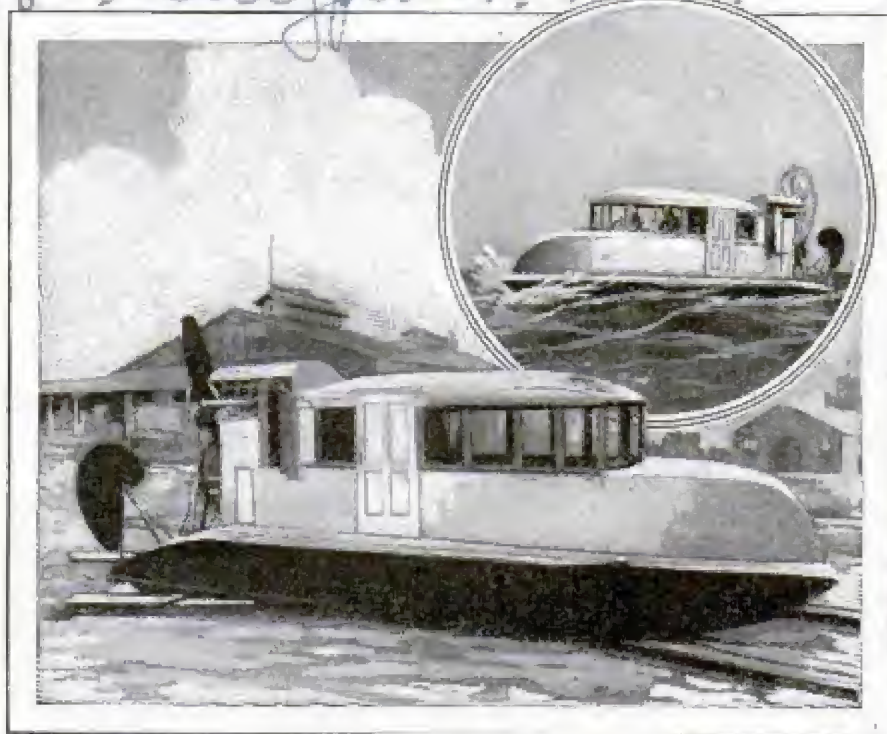


Disk at Left Is Set for English Phrase; Its Equivalent in French Appears on Reverse Side at Right

*E. C. Hayt, H 3 & 35-4 St 125 E
New York*

*Valerian Coast Co., Ltd.
1518 Esplanade, Miss.*

*E. Es. Herbert
Manchester, Eng.*



© M. B. Updike

Sea Glider in the Water and on Land, Showing Its Roomy Cabin, Shape of Hull and the Propeller at the Rear

AIR PROPELLER DRIVES BOAT FIFTY MILES AN HOUR

A sea glider capable of making speeds above fifty miles an hour has been built with a capacity of six passengers. One of its features is the bottom which is ribbed with six V-shaped offsets. They run lengthwise, forming recesses which collect the air, so that the boat rides partly on the air as it is lifted well out of the water as it shoots along. The craft is equipped with a ninety-horse-power engine, an airship propeller, is twenty feet long, six feet wide and four and one-half feet high. The cabin is large and comfortable.

MEAT KEPT FRESH FOR FIFTY DAYS BY HOT BATH

From South Africa comes a report of a new process for preserving meat. Instead of using ice or other means of refrigeration, it is dipped into a hot liquid made from a closely guarded formula. The substance forms a tight skin-like covering over

the meat when it dries, and may be stripped off and used again when the carcass is to be cut up, thus further reducing preserving costs. A sample prepared by the process is said to have been fit for human consumption after it had been kept for fifty days. The meat is reported to retain its natural flavor.

SCIENTISTS RECORD HEAT PRODUCED BY HAMMERING

By means of an apparatus which an Englishman has devised, it is now possible to measure and record by photography the amount of heat that is caused while hammering a nail in wood. The instrument is used for the purpose of studying metals so that new steels and new processes can be devised to meet the requirements of modern metal-working operations. It is a well-known fact that when two metals are pressed closely together and heat developed, an electric current flows from one to the other. This is utilized in the recording apparatus to determine just how much heat is developed in various lathe operations, cutting, drilling and planing. The apparatus is similar to an earlier one used for measuring heartbeats.



Scooter "Bike" on Its Support Brace, and in Use

SCOOTER-BICYCLE IS SAFE AND FAST

Equipped with pedal, sprocket and chain like those of a bicycle, a scooter enables the child to propel himself at considerable speed with less wear on the shoes, and also develops his sense of balance. It is safe to operate, as it is built close to the ground like the ordinary scooter, and therefore can be enjoyed by very small children as well as by the older ones.

1301

1448

*Discovered by H. Pless, Transvaal
Wootton, Benoni*

*Calif. 177 Stillman St.
Dervney Vehicle Co.
Dervney, Calif.*



Kansas Family
Listening to the Pro-
gram Broadcast by Agri-
cultural College

By S. R. WINTERS

"THIS is station WCCO, Minneapolis-St. Paul; we will now broadcast 'Fifty Farm Flashes,' a service prepared by the United States department of agriculture, at Washington. Please stand by."

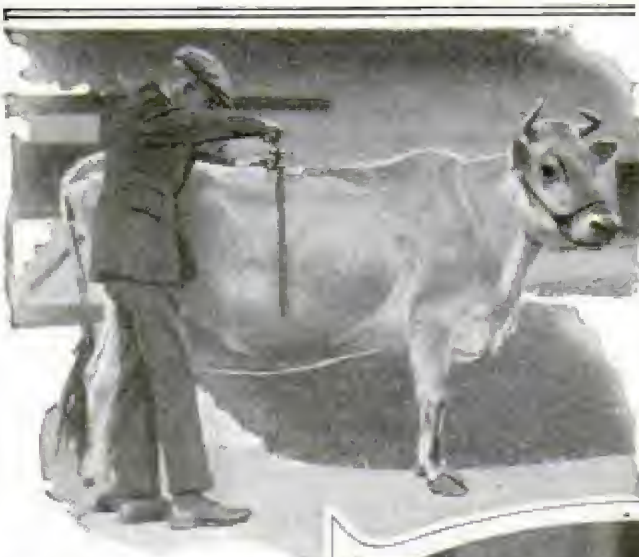
With a variation in the call letters and locations of the broadcasting stations, this announcement may be heard by millions of farmers throughout the nation. It marks a definite and systematic effort of Uncle Sam to tap the sources of agricultural information in Washington for immediate use by its beneficiaries in the rural areas.

Sam Pickard, until recently director of the broadcasting station of the Kansas State agricultural college, has just been called to Washington by Secretary of Agriculture William M. Jardine to become chief of radio service. It is a newly created office and it recognizes the vital role that radio is destined to play in the countryside—the only means of communication capable of flashing a message to millions of persons instantly and simultaneously.

For these and other reasons, the department of agriculture, in creating the office of chief of radio service, is officially recognizing radio along with farmers' bul-

letins, press releases, newspapers, and postal facilities, as a means of spreading the gospel of better farming practices. As a messenger, it is capable of disseminating news with quite the facility of the older agencies of distribution and has the additional advantages of an infinitely greater celerity in delivery and a potential audience of countless numbers. Hence, Uncle Sam's national farming bureau in Washington is to be tapped for information whose useful application depends upon the dispatch of its distribution, and radio will speed up the process of delivery where more laggard agencies would rob the information of much of its value.

"Fifty Farm Flashes," the title which Mr. Pickard employs in designating this national radio service to rural America, radically departs from the usual practice of preparing a lengthy farm lecture and delivering it into the microphone of a broadcasting station. Instead, the flashes will be popular in treatment and will not exceed fifty words in length. The service will form a sort of question-and-answer box, the farmer asking Uncle Sam for information relating to a particular problem and the reply will be broadcast by radio. Therefore, if the question and re-



Measuring a Dairy Cow to Determine Relation of Girth to Milk Capacity; Farmer Getting the Day's Market Reports, and Goat Milker on One of the Government's Farms

ply are of a general nature, probably thousands of farmers will be benefited. For the sake of illustration, let us suppose that a dairyman of Wisconsin detects symptoms of tuberculosis in his herd. If no veterinarian is accessible, he can address an inquiry to the department of agriculture or to his state agricultural college, requesting confirmation of the disease and a method of treatment. Timeliness is an important factor in supplying the requested information and, therefore, the department of agriculture immediately prepares a farm flash on the subject of animal tuberculosis, its symptoms and methods of treatment. A farmer in Kansas, hearing a radio talk on the subject of tuberculosis broadcast from the "College of the Air" at Manhattan, was thus enabled to take speedy action and saved four cows from this serious disease.

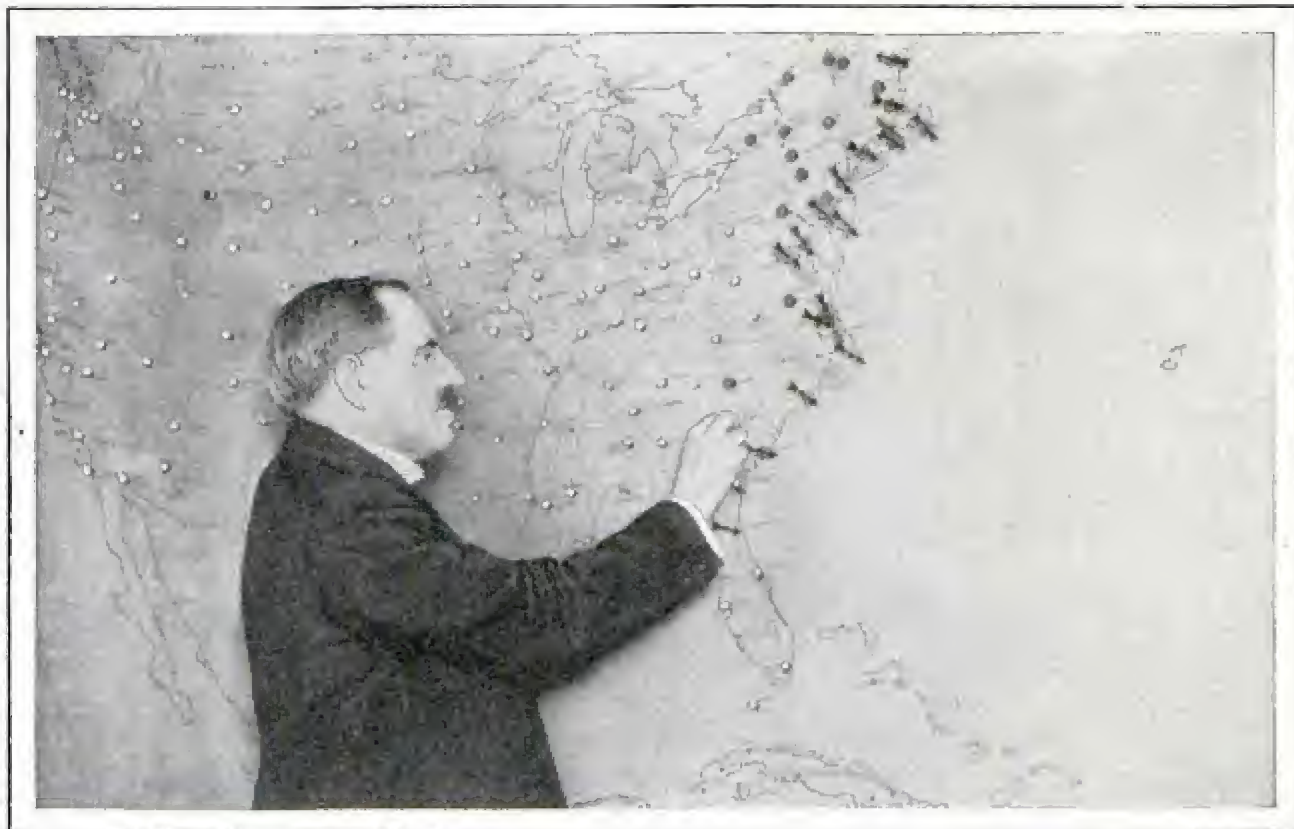
The department of agriculture has no vested rights in a broadcasting station; therefore, in inaugurating this national service, private and commercial stations will be enlisted in a co-operative plan. That is to say, Uncle Sam will supply interesting and informative data and commercial agencies will put the farm flashes on the air. The chief of radio service will

have a wealth of material from which to prepare the fifty-word flashes, since the department of agriculture receives approximately 4,000 letters daily, most of which relate to farm problems. These are of a diversified character—ranging from how to determine the age of a horse by examining its teeth to how to cut and store ice in winter for use in summer. From this barrage of inquiries, subjects of general interest and problems pressing for a solution will be selected as a basis for the flashes. These, when robbed of technical verbiage, will not only be informative to thousands of farmers

but of interest because of the attractive guise in which they are presented.

Tentative plans call for a division of agricultural America roughly into zones with respect to the major crops produced. These classifications will include such dominant crops as live stock, dairying, cotton, corn, hay and pasture, and such types of farming as dry land, range and irrigation. Thus, for instance, a dairyman making inquiry about the disease of a herd or





Prof. Charles F. Marvin, Head of the Weather Bureau, Is One of the Farmers' Most Important Aids, and His Daily Weather Information Was One of the First Things Broadcast by Radio

methods of marketing cream would receive a reply in the form of a flash, say, through a broadcasting station at Madison, that would be applicable throughout the dairying section. Similarly, a cotton grower of Texas seeking information as to an effective method of combating the boll weevil would elicit a reply,

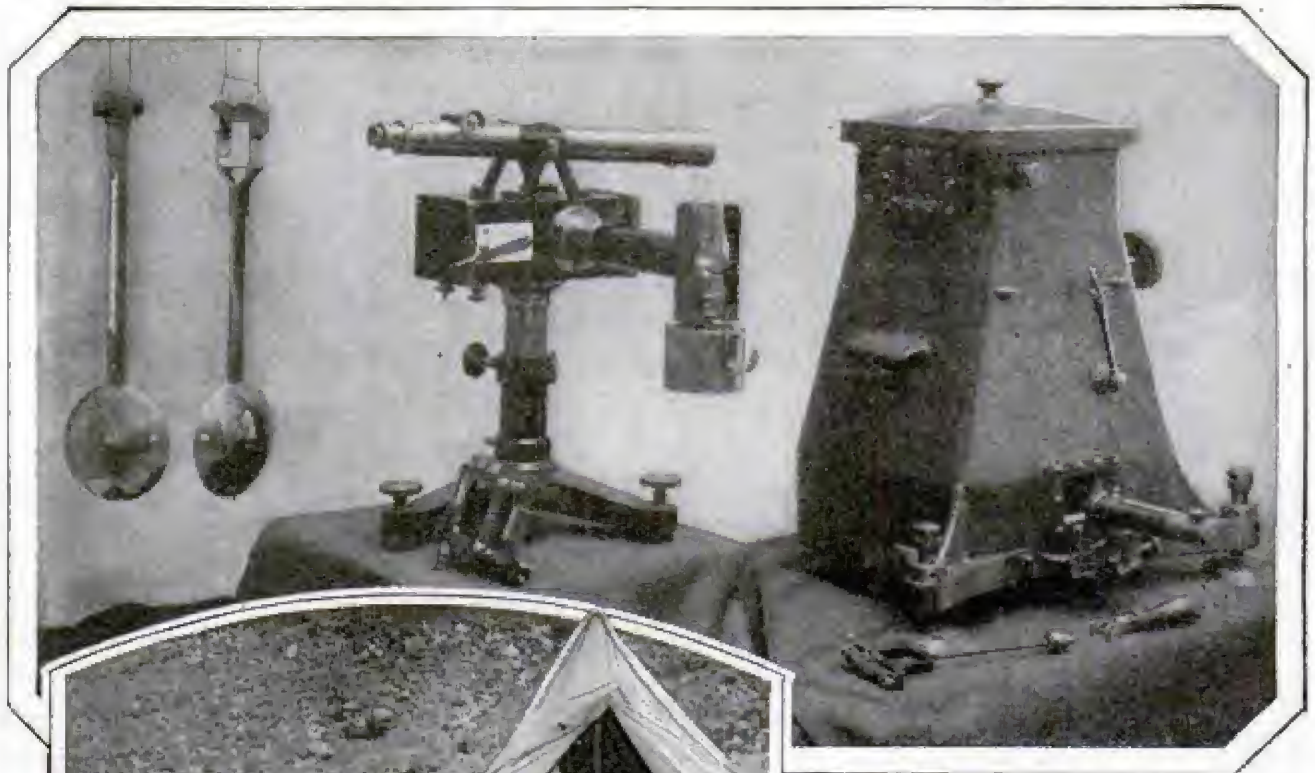
broadcast through a Texas station, of value to the cotton producers of the south and southwest. Or wheat growers in Kansas, could, through the magic of the invisible radio waves, learn of the most effective method of abating the grasshopper evil, and, as an outgrowth of the service, there will be many offshoots to this idea of linking the laboratories of the department of agriculture to the fire-sides of farm homes.



Chief of the Agricultural Department Radio Bureau, Who Sorts the Thousands of Letters Received Daily about Farm Problems, and Prepares Answers to Many for General Broadcast Distribution

1431
950

Mr. John Caruso
POPULAR MECHANICS
The Harragut, Washington, D.C.
JUST HOW MUCH DOES A POUND WEIGH?



Apparatus Used to Tell the Exact Weight of a Pound at Various Altitudes and a Camp of the Geodetic-Survey Engineers

It would seem that a pound is a pound anywhere. So it is, for all ordinary business transactions, but not for the United States coast and geodetic survey. That branch of the government has maintained an expert on the Pacific coast to conduct experiments to determine the variations that actually exist in the weight of a body at various altitudes. In computing these differences the survey measures distances in terms of one-ten-millionth of an inch, and in time in one-hundred-thousandth of a second. Broadly speaking, a mass that weighs 400 pounds at sea level will weigh 399 pounds at an elevation of five miles, while a mass weighing 400 pounds at the equator will weigh 403 pounds at the poles. Scientists long ago discovered that the greater the pull of gravity the slower a pendulum of a given length will swing. For this reason, the apparatus with which the survey's experiments are conducted consists of a pendulum, three

chronometers, a small box containing an electric light with a shutter that can be made to flash a light with each beat of a chronometer, and a telescope, for observing the light flashes as they are returned from the swinging pendulum. On the pendulum is a mirror that moves with it and on its support a stationary mirror. When the pendulum is perpendicular, the reflected rays from both mirrors coincide, and by measuring the time interval between two successive coincidences the exact period of the pendulum is found. This figure is the basis for calculating the pull of gravity and, hence, in turn, the "weight of a pound" at any particular spot of the globe.

1474 GLARE GUARD ON WINDSHIELD INCREASES SAFETY



Automobile drivers are protected against the glare of headlights and the sun by a circular piece of transparent material, colored

to reduce the light and held to the windshield by suction. It is placed slightly to the left of the driver so that he can avoid the glare simply by turning his head

The Staroff Mfg Co.
S i o u s F a l l s

MUD AS PLASTER FOR OIL WELLS

Mud has acquired industrial dignity not only for building houses but in the oil fields. In drilling the wells, sand and loose soil from the various strata are likely to cave in and fill up the hole. To prevent this, the walls are sometimes plastered with fluid mud which coats the hole sufficiently to prevent the sand from falling. Mud suitable for this purpose is found in considerable quantities near Wilmington, Calif. It is scraped out, hauled to a mixing plant and pumped into tank cars for shipment to the oil fields.

SIX-TON ROLLER STEERS EASILY

Besides other interesting features, a motor-driven land roller developed in Germany has two cylinders on pivots in front to facilitate steering and handling on uneven areas. The three rollers together weigh 13,200 pounds, and the engine is of forty horsepower with speeds of three and one-half to four and one-half miles an hour. The implement is devised particularly for leveling ditches that have been abandoned



Huge Land Roller with Its Two Front Cylinders on Pivots for Easier Steering

and is said to exert such pressure that small burrowing animals, and larvae of most insects, are crushed to a depth of two inches in the soil as the rollers pass.

Children Playing the New Safety Game; the Board Represents Streets, and Moves of the Men a Walk Across Town

SAFETY GAME SHOWS CHILDREN HOW TO AVOID ACCIDENTS

Amusement and helpful instruction both are afforded in a safety game devised by two school-teachers to show children the importance of crossing streets with care and otherwise attempting to avoid accidents. Moves are made on a board ruled to represent city blocks and streets. The evils of "jay walking" and other forms of carelessness are said to be illustrated while playing the game.

AMERICA BUILDS HUGE DREDGE FOR RUSSIAN GOLD MINE

The largest placer-mining dredge ever built, costing more than \$1,000,000, recently was completed in a Milwaukee factory and shipped to Russia. It will be used in the placer workings on the Lena river by a British-American corporation which has obtained a gold mining concession from the Union of Soviet Republics. The dredge, which has an excavating capacity of seventeen cubic yards, required seventy-five railroad cars to carry its parts from the factory to the coast. The superstructure alone weighed 1,200 tons, and when assembled, will be 170 feet long, sixty feet wide and fourteen feet deep.



Walter Junior High School

Motorenfabrik Henty & Co.
Köln - Henty & Co. Maschinenbau

Lucy & Co. Milwaukee Wis.
South

Lena Goldfield, Ltd.

1397



Some of the Hand and Finger Signals to Help Ushers Seat Theater Patrons

USHERS' HAND-SIGNAL SYSTEM HELPS ASSIGN SEATS

Ushers in a California theater relay information as to the number of vacant seats by means of a code of hand signals. When the message reaches the usher nearest the door, she, in turn, conveys the number to the attendant there so that the right number of persons may be admitted, saving time and confusion.

PLANT SETTER SPEEDS GROWTH AND SAVES WORKERS' TIME

As many as eight acres of plants can be set in one day with a horse-drawn apparatus with seats in front for two men where they are protected from the dust. The apparatus insures parallel rows and even spacing, and plants can be imbedded at various depths by regulating a lever at the driver's right hand. The growths are said to be given a good start after transplanting, so that they come



Plant Setter in Operation on Large Field

into bearing ten to fifteen days earlier, permitting advantageous marketing. The actual planting mechanism consists of a shoe that opens a furrow, a valve and pack wheels, or plates, to press the soil firmly around the plant. A water supply is carried in a large galvanized tank that holds fifty-five gallons. Attachments are also provided for setting out young trees, and for planting potatoes and distributing fertilizer at the same time.

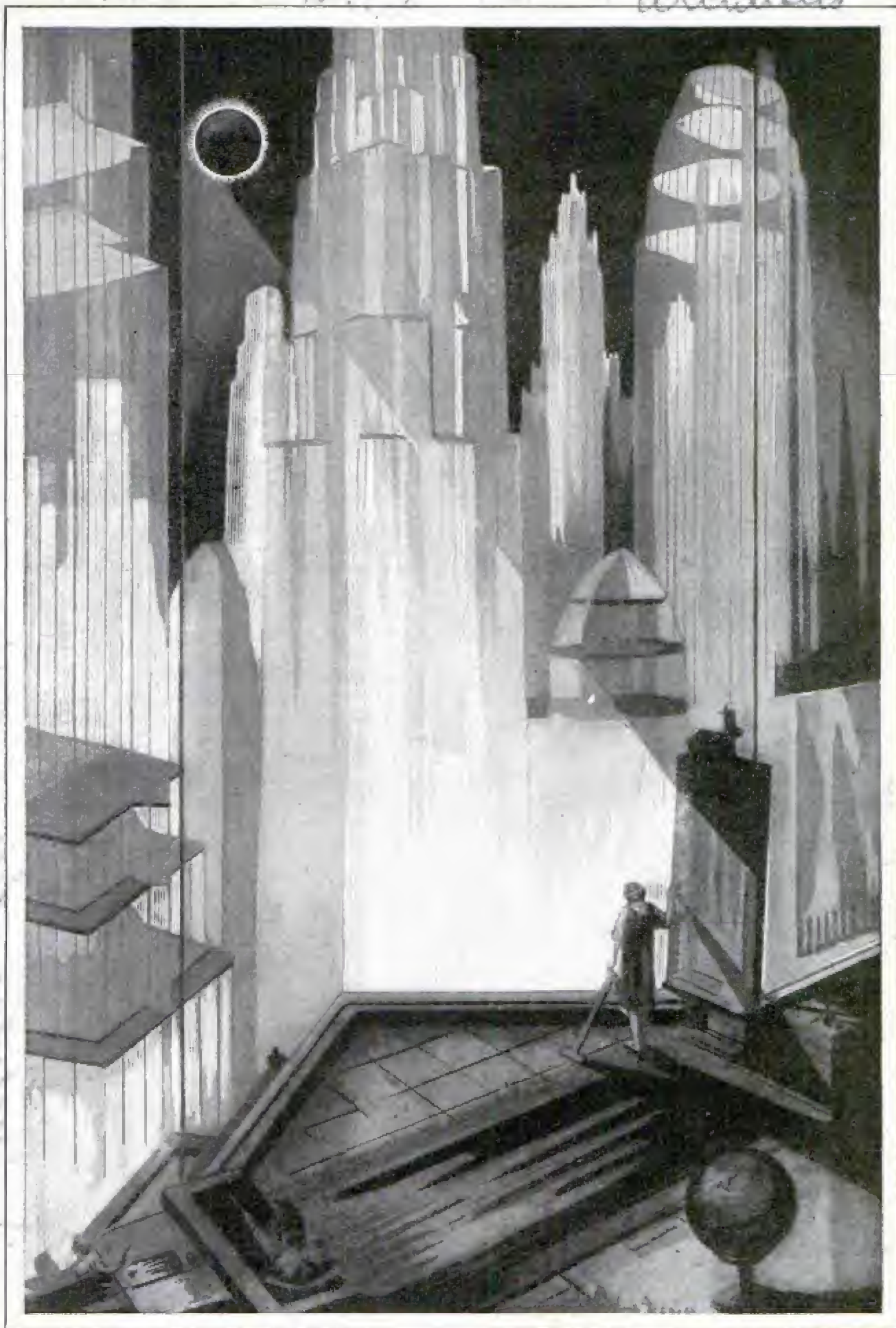
GLASS SKYSCRAPER ON HORIZON ARCHITECT DECLARES

Visions of great city structures of glass and steel, with walls like one vast window, are seen by an eastern architect, not as a remote dream but as a logical and practical step in the evolution of building. He states that the problem of light in city areas is now more acute than ever, that its healthful qualities are generally accepted, so that architects not only realize the importance of buildings that will afford abundant natural light, but see in glass tremendous possibilities for artistic and utilitarian effects not yet approached. Problems to be overcome are the fusing of glass walls with steel construction, the proportion of frames to glass, the shape of the glass units and details as to the method of opening and closing windows, as well as improvements of the quality of glass and the manufacture of the new kinds that would be necessary. Already, the architect points out, glass has been freely used in building; for instance, in the Rodin studios in New York city, the north wall of which is almost entirely of glass. The change from structures of this kind to a glass skyscraper, he says, is a

step in the "evolution of the window." One big advantage of glass for building is that it is impervious to air, allowing use of vacuum spaces between double glass walls so that protection would be had against the heat of summer and the cold of winter. The splendid views that would be possible from glass buildings and the opportunities for the use of color, are additional factors that commend the plan.

The new idea spreader Co.
Coldwater, Ohio

Ludlow & Piabody Architects



Courtesy Hugh Ferriss

Will Our Cities Some Day Look like This? Artist's Vision of Group of Glass Skyscrapers in Which Windows Have Developed into Walls; Figure in Foreground Is Standing in an Office

New York Times Magazine
3/24/

Stockholm 7, Normalatorg 2, Sweden.



Radio-Exchange Day at the High School, Where Sets Are Traded and Parts Purchased by Youthful Enthusiasts

1580 HIGH-SCHOOL RADIO EXCHANGE AIDS STUDENT SET BUILDERS

Once a week at a Chicago high school radio fans meet in a special section of the basement to display their sets, exchange ideas, trade, buy and bid for different parts. The hour provides an opportunity for set builders to display the features of their handiwork, examine the points of new circuits and obtain good bargains.

1483 ELECTRIC HEAT MAKES ICE WITHOUT MOVING PARTS

Operating without a motor, valves, fan or other moving parts, a refrigerating unit that may be installed in almost any domestic ice box, uses electric current, a small gas burner or exhaust steam for heat to secure the necessary freezing action. It is charged with distilled water, ammonia and hydrogen and consists of three main parts, a generator, absorber and evaporator. As all pipes and containers are tightly welded, the substances in them last indefinitely and a circulation of cooling water is all that is necessary to add besides the heat. If desired, temperatures as low as one degree Fahrenheit can be produced, it is reported, while an even coldness just above freezing and suited to the most satisfactory preservation of food, is easily maintained. The unit operates continuously and functions by

the evaporation of the ammonia in a low-pressure part, condensation occurring in a high-pressure portion so that the cycle is automatically repeated. The circulation is achieved by means of thermo-siphon action, and the hydrogen is introduced into the low-pressure portion of the refrigerator in such a way that the need of a reducing valve is eliminated. The heat applied to the generator, which contains a mixture of ammonia and distilled water, causes the ammonia to rise. As it passes through the water-

cooled condenser, the gas is liquefied. Water vapor passing off with the ammonia is condensed in a rectifier and flows back into the generator. The actual refrigerating stage occurs when the ammonia falls upon a series of baffles and evaporates under the partial pressure to which it is subjected as a result of the inflow of hydrogen. In a lower compartment of the brine tank surrounding the evaporator are the trays that are to be filled with water for making pieces of ice.



Opening Ice Drawer and View of Freezing Unit in New Refrigerator

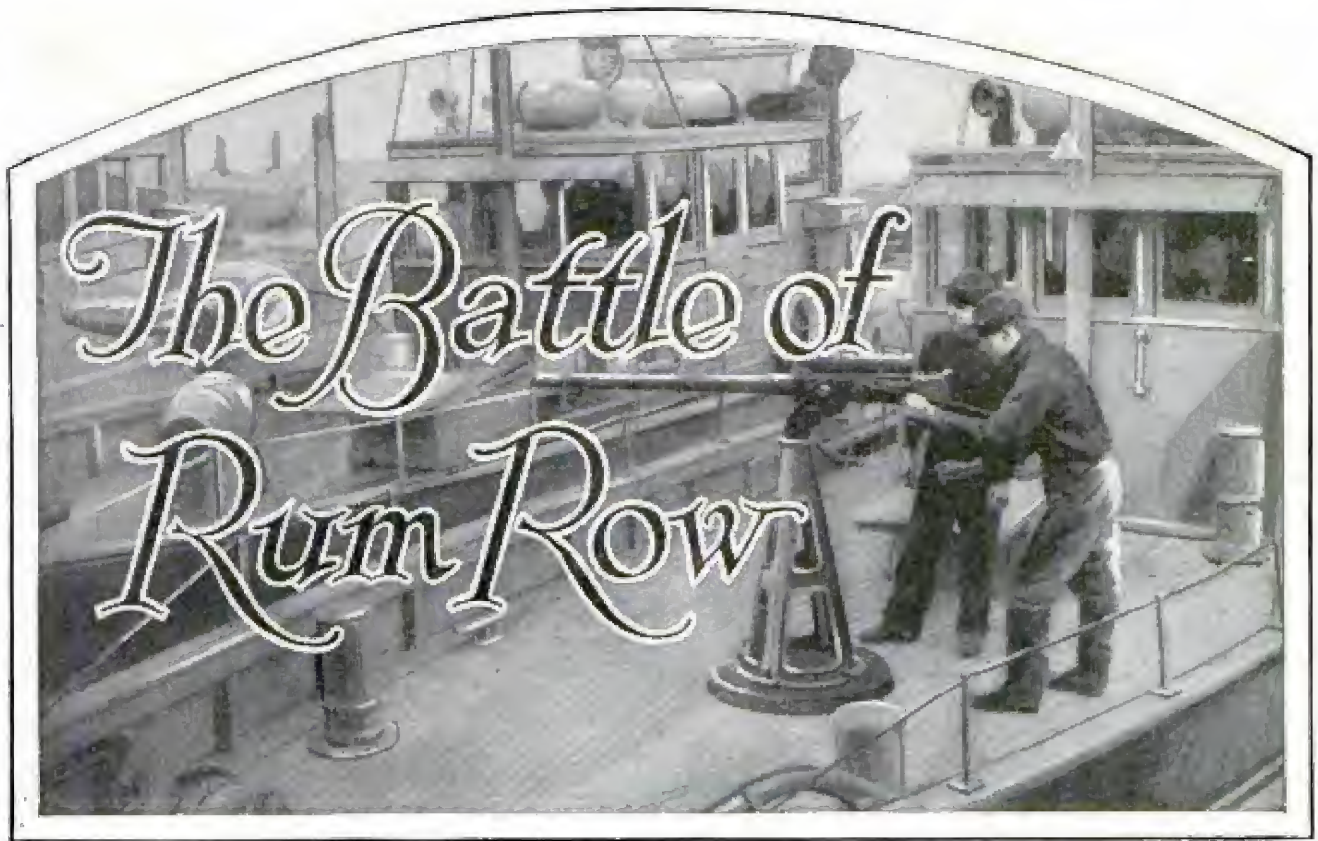
Divs Two Swedish engineers.

On market next fall

new York

U.S. Electric - Sarnel Corp. 51 E. 42 nd St.

Electrolux Ltd. 153 Regent St. London



Matching Cunning with Strategy Coast Guard, in Speedy Patrol Boats, Pickets Liquor Schooners and Fends Off Bootleggers

By AUSTIN C. LESCARBOURA, *Croton on Hudson*

SOMEWHERE off Block Island, a few miles from the Rhode Island shore, the winter night has settled down on a December gale, scudding snow and a welter of tumbling waves. As the early twilight deepens it blots out a frowsy, unkempt old schooner, resurrected from some graveyard of once good ships, and now riding out the blow at anchor just safely outside the twelve-mile limit where the jurisdiction of the United States ends.

Round and round the old ship, deep-loaded with a hundred thousand dollars' worth of contraband liquor, scuttles a trim little seventy-five-foot patrol boat, keeping a lonely sentry duty. The big gray-backs, rolling in before the storm, slide under the little speeder's hull, lift her high in the air, and drop her, nose first, down the next trough, rolling her at the same time from side to side so that our landsman's legs, even after three days at sea, are hard put to it to keep a footing.

But in the tiny cabin it is warm and cozy and thick with tobacco smoke. Surely, the visitor thinks, no bootleggers from shore will be venturing out on a night like this in search of a cargo of contraband. And then an eager-faced young coast guardsman bursts into the cabin, salutes, and announces a rum runner sighted off

the port bow. The skipper slides into an oilskin coat and we dash on deck, where only the soft red and green of the running lights and a dim glow over the compass relieve the gloom. The youthful officer, not long out of the coast-guard academy at New London, shouts an order. A powerful searchlight snaps into action and picks up the rum runner's boat. Squat, paintless and time-worn, she looks, under the searchlight, like any ancient and peaceful old fishing boat, plodding along about its business. But as the searchlight beam centers on that stolid-looking boat there is a staccato roar and she starts away from that spot somewhere off Block Island like a thoroughbred racer. Concealed beneath her peaceful-looking deck are two or three ex-airplane engines, each with twelve good cylinders and tuned like a high-priced watch.

The patrol boat goes into high and starts in pursuit, but is no match for the speeder ahead. But up forward two young coast-guard sailors have slipped the tarpaulin lashings off a businesslike one-pounder, and at a shouted order, slide a shell into the breach, snap the block shut, and pull the lanyard.

We watch for the splash of the shot, but there is none.

1256



Loading a Three-Inch Gun on One of the Big Coast-Guard Boats; These Furnish Pointed Warnings to Rum Runners to Stop

"Blank," the skipper briefly explains. "Just a warning."

Up ahead, the rum runner ignores the warning, and, with her superior speed, is rapidly drawing out of range, while the beam of the searchlight grows fainter and fainter where it reflects back from the boat.

Another shell, and this time there is a fountain of water shooting skyward just ahead of the rum boat. A third shell, and a splash well astern. Superior speed, and the pitching of the patrol boat through the waves, have won a victory for the bootleggers, at least for the present.

The captain hurries back to the radio shack and gives an order, and then we adjourn to the warm cabin to continue our interrupted conversation.

A half hour later and the radio operator comes in, grinning broadly.

"The destroyer got that one," he reports.

Rum running, even on stormy nights in winter gales, is not so easy. If the picket boats don't catch you, the destroyer often will.

The wholesale revival of the age-old custom of smuggling has been met by Uncle Sam with wholesale preparations to

prevent it. Every mile of coast where the rum boats flourished has been charted and divided up and patrolled. Out at sea, where the liquor-loaded ships from abroad drop anchor with their cargoes, lie the picket boats, one for each liquor ship. In each district, commanding the activities of the picket boats, checking arrivals and departures on rum row, and lending a hand to run down the bootleggers' speed boats that come out from shore, is a converted war-time destroyer, capable of making thirty-five to forty knots, carrying a heavy armament of long-range guns, and a crew of 120 men.

Inshore, among the bays and coves from which the runners come, is the third line of defense, speedy little thirty-five-foot craft capable of holding their own with even the best of the bootlegging boats. And along the shore itself are the seaworthy little Seabright dories manned by coast-guard crews, armed and ready to resist the actual landing of liquor, if it gets past the other defenses.

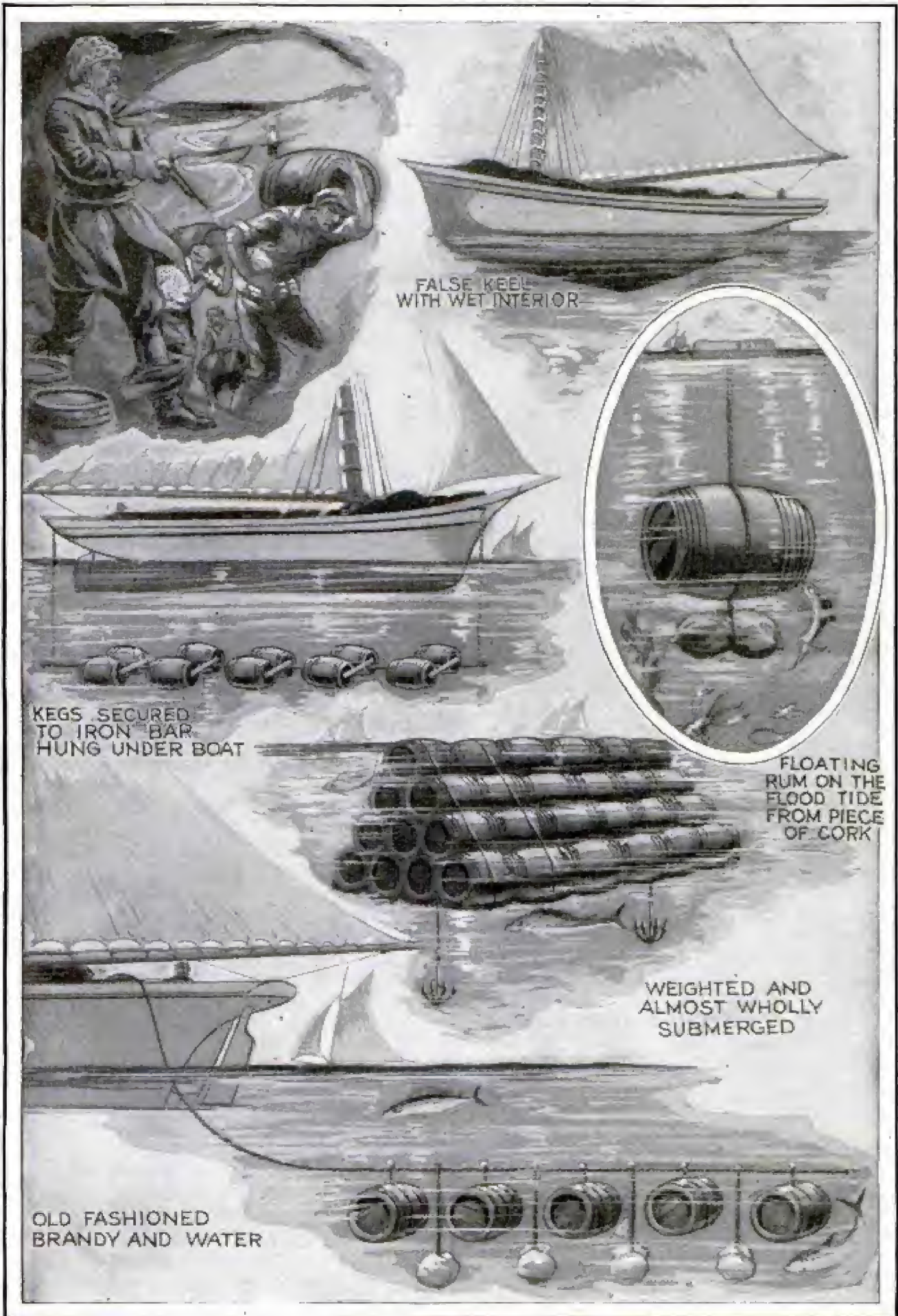
The defenses are so effective that, since they were inaugurated, the rum row off Long Island and the New Jersey coast, from which

the bulk of the liquor landed near New York comes, has dwindled from as high as 101 ships at one time, to an average of not more than four or five. Steamers have disappeared entirely from the trade, both because they represented too great an investment to risk seizure, and because, with picket boats constantly near, it takes weeks or months to unload a cargo, too long to tie up a valuable ship and feed its large crew.

Instead, such rum boats as persist in the trade are usually old schooners, reconditioned for the business. If they are lost or captured the loss is not great, and the carrying capacity of even an old schooner of average size is sufficient to pack anywhere from \$50,000 to \$100,000 worth of whisky, at rum-row prices.

I went out with a picket boat from New London to stand a four-day tour of duty. The destroyer commanding the area had reported by radio that a large three-masted schooner, flying the British flag, had dropped anchor off Block Island and was acting in a suspicious manner.

We reached the scene, just outside the twelve-mile line, and took up the job of



Some of the Disguises and Deceptions, Practiced Long Ago by Rum Smugglers in England, Which Are Now Being Revived by Crafty Boatmen to Cheat the Coast-Guard Patrol

keeping off the boats from shore. So long as the rum ship keeps outside the territorial waters, it can not be boarded or molested, but any boat establishing contact with it from land, is violating the law, and can be captured or, if necessary, sunk.

A dark night in a howling wintry gale does not look like a good time to put out from shore for a twelve-mile run to sea in a small motorboat, but, next to a fog, a storm is the bootlegger's best friend.

"The rum runner takes the most desperate chances," the skipper observes. "He does things which no sane man would think of doing; in fact, he often plays a losing hand, being urged on by the high stakes. Were he engaged in a lawful occupation, the rum runner would be a hero because of the bravery he would be exhibiting in the pursuit of his duty. As it is, it becomes sheer foolhardiness. On a night like this, when the weather is ugly enough to keep any sane man at home, the rum runner is out.

"If they insist on coming, that's their funeral, and I mean that literally. Many of them have gone down in storms which proved too much for their frail and overpowered boats. Our own craft are built for seaworthiness more than for speed. The public thinks we must chase the rum runner, but, as you have seen, there are

other ways of catching him. Our prime job out here is to watch that schooner, and if the rum boats get away from us, the radio is ready to set the trap farther in, or even on shore.

"Foggy weather is the best ally the rum runner has. It provides a screen behind which he can work, but, of course, it likewise provides a screen behind which we can approach and attack, so it works both ways.

"They are well organized and have all sorts of tricks and cunning to dodge us. The mother ships, which bring the stuff in from abroad, are constantly shifting their position in hope of throwing us off the track for even a few hours, sufficient to discharge a cargo, but no matter where they shift, the bootleggers on shore seem to be so well informed that they can go right to the spot. Frequently, after being well picketed in one spot, a schooner will hoist her anchor and put out to sea for forty miles or more, then turn and come back to a new anchorage, miles away. Almost invariably, however, one of the patrolling destroyers spots her and has a picket boat on the job when she arrives."

Occasionally, in a storm, or through shortage of provisions or water, one of the rum-row boats is forced into American waters and captured. Under the special agreement with England the ships

must stay twelve miles out to avoid trouble, while ships of other nations must keep outside the old three-mile limit. Ambiguities in the new English treaty led to the seizure on one occasion of a fine big steamer. The treaty had fixed the limits at twelve miles, or one hour's sail from land. The steamer dropped anchor just outside the twelve-mile line, and apparently was safe, but coast guardsmen, eyeing such a rich prize, tried a bit of strategy. They obtained a high-powered sea sled, which covered the twelve miles in something less than half an hour, and then seized the ship for being within one hour's sail from land. She was released later to avoid international complications.

Life aboard the seventy-five-foot picket boats is no sinecure. The quarters are cramped, and, except an occasional brush with a bootlegger, life during the four-day tour of duty is dull. Each of the boats carries eight men, the captain, cook, and six seamen,



One of Twenty Former Navy Destroyers Turned Over to the Coast Guard to Fight Rum Runners



Cadets of the Coast-Guard Academy, at New London, Being Trained for Officers, Are Put through Much the Same Drills as Those Attending the Annapolis or West Point Academies

three for deck duty and three below. A new series of bigger boats is being built—110-footers, powered with Diesel engines instead of gasoline motors, and mounting three-inch guns instead of one-pounders. All of the coast-guard boats likewise carry several machine guns, standard Springfield army rifles and revolvers, the latter weapons for the boarding parties which take over the captured ships.

There is rarely any trouble when a rum runner is overhauled and forced to stop. The coast-guard ship lies alongside, with a one-pound or three-inch gun trained on the captive, while the boarding crew goes aboard.

So effective has the patrol become that liquor smuggling before long may cease entirely as a wholesale institution and resort to the petty retail methods employed by the English rum smugglers in the eighteenth and early nineteenth centuries, when smuggling was designed to defeat the heavy import duties on French liquors.

The smugglers adopted many ingenious schemes to escape search and seizure. Small tin tubes were fitted into hollow oars, into the handles of fishing nets, and other gear of the boats. False bottoms and false partitions were used, water casks with double insides, one containing water and the other liquor, and one smuggler hollowed out the brick ballast of his ship and concealed liquor in tins within the stones. Another old smuggling trick, resorted to by the "Fox" and "Lovely Lass," two famous smugglers' smacks, was a double bottom which could be reached only from the outside. The cargo was taken aboard at low tide, when the ship was stranded on the sands, and was unloaded in the same way. When the boat

was afloat there was no way of reaching the cache, nor was there anything to indicate to the custom guards that such a double bottom even existed.

The trick of towing cargoes of whisky cases ashore behind ordinary fishing boats, the bottles being held under water, has been tried out along Long Island shores in recent months, but there is nothing new about it. It was used more than a hundred years ago in England. As a variation, rafts which floated under water were tried with some success.

The United States has always had a certain amount of smuggling, but, before prohibition, it was confined largely to bringing in diamonds and other precious stones, to escape the duty; to bringing cigars from Havana, to importing contraband drugs, and to smuggling in Chinese and Hindus, who had been barred from the country for many years.

Prohibition, and later the immigration-quota law, offered the first opportunity for smuggling on a really large scale.

When the dry law came into being, the coast guard was devoted largely to life-saving and kindred activities. It had a number of large seagoing ships, but all were far too slow for the new work. Not only a fleet of fast ships, but the men to man them, had to be obtained.

More than 8,000 seamen and some 700 officers are now in the service. The officers and men are all trained at New London, where the coast guard operates its own academy, modeled much after the naval academy at Annapolis. Here the future officers are taken in as boys between eighteen and twenty-four, put through an intensive three-year course and then commissioned.



Wooden Horses Used for Deck Derbies, and a Section of the Track; "Steeds" Are Advanced by Throwing Dice and Wagers Are Laid on Favorites Named for Real Horses

RACES WITH WOODEN HORSES AMUSE PASSENGERS

Deck derbies with wooden horses are proving popular pastimes for passengers on ocean voyages. The racers are given the names of real turf favorites and are advanced on the track by the throw of dice of the participants in the game.

UNKNOWN ELEMENT IS FOUND WITH AID OF X-RAY

Discovery of an unknown chemical element by Dr. B. Smith Hopkins and associates, at the University of Illinois, leaves but four of the possible ninety-two simple substances on the earth yet unidentified. The find was made with the help of a special X-ray apparatus devised at the university. According to the announcement of the discovery, every known element may be made to produce X-rays which affect a photographic plate in a definite way, so that the process enables the scientists to determine which

element is being handled. In the research which led to the find, rare earth specimens containing a percentage of the unknown element were prepared and subjected to the X-rays and the element, which has been named Illinium, thus identified.

WOODEN SHIPS BUILT FOR WAR NOW USED TO CARRY LOGS

Not all the wooden ships constructed during the rush of the World War have been doomed to destruction, for on the Pacific coast several are in service as log-carriers across straits too rough for the



Ships Built for War Service Adapted for Logging; Crane Swings Pieces Aboard for Haul across Straits

Cmt. P. G. Melrose, 73
Douglas Lodge, D.C.

Professor of inorganic Chemistry

usual rafts. They have proved successful in shortening the time required to transport the logs from the woods, which are now considerable distances from the mills. Practically only the hulks of the ships are utilized, short decks being left at the bow and stern to facilitate handling, so that the entire vessels are little more than large hatchways. This is essential, as the logs are cut to a minimum size of thirty-two feet and most of them are forty feet or more in length. Powerful tugboats take them in tow when they are loaded and speeds of four to six knots are made.

MUSIC CODE IS SENT BY CABLE TO FOIL SONG SMUGGLERS

To protect song composers against "smugglers," who sometimes rush the music abroad and publish it there before it can be copyrighted, a cable code has been devised. It is based on an alphabetical arrangement to cover notes and time beats, and can easily be translated into musical terms with a simple key. As soon as a song has been composed, it can thus be flashed abroad before the smuggler can steal a march on the author. The plan is expected to be of great aid to small publishers especially, as most of the larger firms already are protected by having their works copyrighted simultaneously in the United States and England.

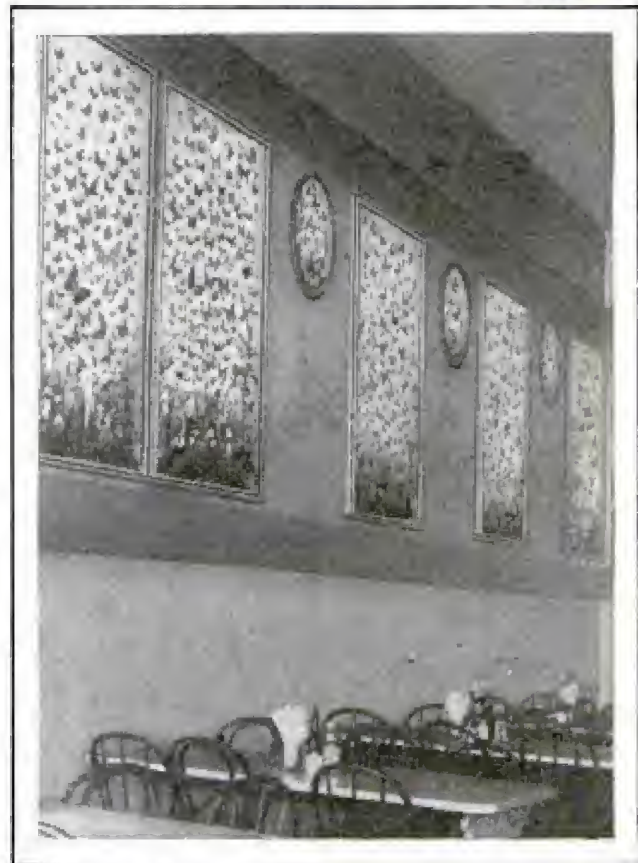
Christian Science Monitor
3/16/26

MOUTH SHIELD FITS ON GLASSES PROTECTING AGAINST DISEASE

Intended especially for physicians, dentists and barbers, a mouth shield that can be quickly attached to the spectacle frame, protects the wearer and patient alike. It is made of transparent material, does not hinder the breathing or speech and if the user does not wear glasses, it may be adjusted to a frame without lenses or hooked on the special mirror used in making eye and throat examinations. It is said to have proved especially helpful to surgeons performing operations or examinations in which contagion is a factor. Barbers and patrons are finding them beneficial, and they indicate attention to sanitary matters, now emphasized in modern shops.



Uhlemann Optical Co.
511 N. Dearborn St. Chicago



Restaurant Walls Decorated with Panels of Rare and Beautiful Butterflies Collected by Proprietor

BUTTERFLY PANELS ON WALLS DECORATE RESTAURANT

Butterflies collected by a western enthusiast have been mounted on glass-covered panels and hung on the walls of the naturalist's restaurant, where they form a decorative display and arouse the interest of patrons. The collection includes a number of rare specimens.

SPEED INDICATOR FOR ENGINES TO HELP RAILROADING

To eliminate guesswork as to the speed of locomotives, an electric indicator has been devised. It consists chiefly of a magneto-generator driven from one of the engine wheels with an electric connection to an indicator in the cab. This shows the speed in miles per hour. The instrument can be attached to any type of locomotive with ordinary hand tools. Belts, pulleys, and special gears on long flexible shafts have been tried in connection with speedometers for engines, but with little success because of the vibration, rocking and swaying motion of the "iron horse." The new speed dial is expected to aid engineers greatly in keeping on schedules and within the limits of safety signals, although their skill in keeping on time without it has given little trouble.

Westinghouse Electric
6 Myrtle St. East Pittsburgh, Pa.



Oxygen Gauge
Adjusted to
Measure
Amount Consumed during
Person's Different
Activities



OXYGEN GAUGE FOR WORKERS TO IMPROVE VENTILATION

How much oxygen do we use and need while engaged in various forms of work? By means of an ingenious apparatus used at the Carnegie institution in Boston, it was found, for instance, that a woman needs more oxygen when she is ironing clothes than she does while sewing, and by studying various ratios of this sort, better understanding is gained of the human machine and ways found to increase its efficiency by improving ventilation systems in factories, offices and other places. The gauge consists chiefly of instruments for measuring the amount of air inhaled and exhaled, and analysis of that breathed out shows how much oxygen has been consumed.

FIRST SHIP FOR CARRYING OIL BUILT FOR CIVIL WAR

One more illustration of how the demands of war have aided the arts of peace is found in the origin of the great ocean traffic in crude petroleum, a business that

now employs more than 1,000 vessels, aggregating over 8,000,000 tons. Credit for the first tanker is given to the late Wilhelm Riedemann of Hamburg, Germany. In 1880, he bought the "Andromeda," a fast sailing vessel which had been constructed for the north to catch slave traders and blockade runners during the Civil war. The ship was of unusually

strong design and had often attained seventeen knots an hour under favorable conditions. Included in its equipment was a huge tank that had been used for water supply. Riedemann conceived the idea of filling this tank with oil. The plan was so successful that when the "Andromeda" returned from a trip around the world, it was fitted with forty steel tanks connected with pipes, and the ship was used as an oil carrier. Riedemann then planned to build a vessel especially for the petroleum traffic, but his idea was branded as "crazy" by various firms until one was finally found to construct a tanker with a carrying capacity of 3,400 tons. From this ship has developed the oil ves-

sels of today, which constantly have been growing larger until now some of them hold more than 140,000 barrels.

RESERVOIR UNDER PEN POINT HOLDS INK SUPPLY

Writers are spared the inconvenience of having to dip the pen so frequently with a type of holder that provides a small metal piece fitted under any style of point. This acts as a sort of reservoir, holding sufficient ink for writing between fifty and 100 words with only one dipping. The attachment also regulates the feed so that the flow is smooth and even, much like that in a good fountain pen.

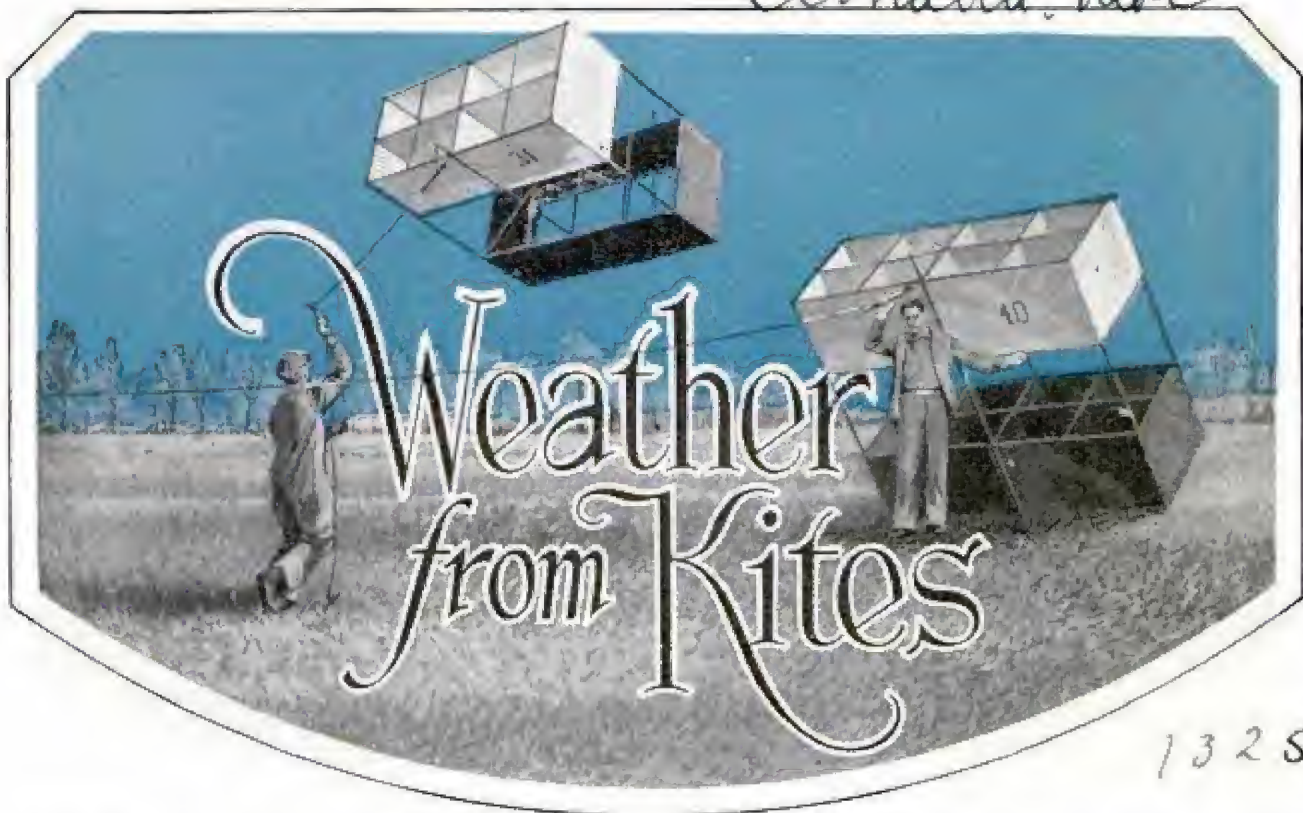


More than 174,000 schools in the United States have only one teacher.

negotiation
Laboratory

Chicago

Wendel
Hall & Hall



Uncle Sam, Champion Kite Flyer, Builds Them So Big and Flies Them So High That They Bring Back Reports on the Weather

FLYING box kites so big they take a special electrical windlass to hold them, and sending them so high it takes the machine a couple of hours to reel in the miles of strong steel piano wire used for a string, is one of the important, but least known activities of one of Uncle Sam's departments, the United States weather bureau.

In a barn on a Nebraska farm the government for more than ten years operated its official kite factory, from which the big box flyers were shipped to the weather observers at half a dozen kite-flying stations. Building and flying kites for the government is nothing like the kite building of childhood days; instead it is an exact and highly developed science.

The big box flyers—the average size incloses about 2,880 cubic feet of space—carry aloft four trained observers who bring back complete written records on temperature, humidity and wind velocity at various heights from the ground up to several miles. The four observers never make a mistake, for all four, condensed in one small container, are automatic recording pens, writing their observations as they go up and come down on a clock-work-driven sheet of paper.

To lift the weight of the recording apparatus takes a big and strong kite, yet one that is lightly built. Straight-grained

spruce, carefully dried and shaped, forms the sticks, and the cover is selected muslin, white on one end of the kite and black at the other, so that the observer, armed with powerful glasses, can see the white against black thunder clouds or the black end against the pale blue of a summer sky.

The instruments themselves make a good load for one kite, so three or four are often used on high flights, the extra ones taking up the load of miles of steel wire, leaving the leader, with the recording apparatus, free to soar. The following kites also serve as insurance against accident, should a sudden storm cloud wet the taut muslin of the leader, shrink it still tighter and burst the frail spruce sticks. When that happens, as it sometimes does, the following kites are able to support the load while they are reeled back to ground.

Despite all precautions, one of the kites occasionally breaks away and starts off across country at express-train speed. How far a free kite, breaking away three or four miles in the air, can go is surprising. From a height of only two miles, one which broke loose near the southern border of North Dakota, flew northeast diagonally across the entire state, passed over most of Minnesota, and came down not far from the Canadian border. The finder read the return address, provided for emergencies, and shipped the valuable



Above, Observer with Theodolite Prepared to Follow Ascent of Weather Balloon; Center, a Revolving Kite-Reel House, Where One Man Operates the Kite Reel and the Observer Charts Currents at Various Altitudes by the Kite's Movements; Below, Attaching the Recording Instruments to the Lead Kite

instruments, worth \$250, back to the station. The government provides a suitable reward for such returns.

Flying the big kites is a dangerous pursuit. Benjamin Franklin, when he made his famous kite experiment, never knew what a close shave he had. Fortunately for the United States, Franklin's silk cord was not a very good conductor, and his kite did not go very high before he got his electrical spark and was satisfied to call it a day.

Flying miles in the air at the end of a steel wire, the weather-bureau kites frequently pick up static registering as high as 150,000 volts. The observers on ground wear heavy rubber gloves and rubber boots as protection during thunderstorm weather, and take care at all times, for there is always danger of getting struck by the wired lightning, even on a clear day. In the finest of weather voltages running around 25,000 are almost constantly recorded. The observer watches the registering meter constantly, as one of the aims of the weather bureau is to learn all it can about static and its effect on the weather. The piano wire is grounded, through the framework of the electric reel, but even so, at least one fatal

accident is on record. A workman at the Ellendale, N. Dak., station, standing on wet ground near the reel, with a length of wire over his shoulder, turned and brought the end close to the mechanism. The lightning bridged the gap and struck the man dead.

Thunder and lightning in the sky are not necessarily an indication of high voltages. During a summer thunderstorm the meter may record 100,000 volts and then, in the dead of winter, show 150,000, which likewise goes to prove that the absence of static interference with radio during the winter, and its prevalence during the summer, do not necessarily show the amount of electricity in the sky.

Because of the size of the equipment needed to fly the kites, it is necessary to have it permanently mounted, and yet under cover, so each kite station has a

small revolving house, which can be turned to bring its open doors at the right angle to lead the kite wire out and down the wind.

It takes considerable time to get one of the kite strings into the air, because the wire must be payed out slowly and steadily. If the kites are not to be broken by the rush of wind, they must be reeled in as slowly. It takes about two hours to bring a string down from a height of three miles or more,





Preparing to Fly the Kite; the House Which Covers the Electric Reel and Instruments Revolves So That the Open Door Can Always Be Turned Downwind for the Flight

and one station has the record of having flown its lead kite four and a half miles above the earth.

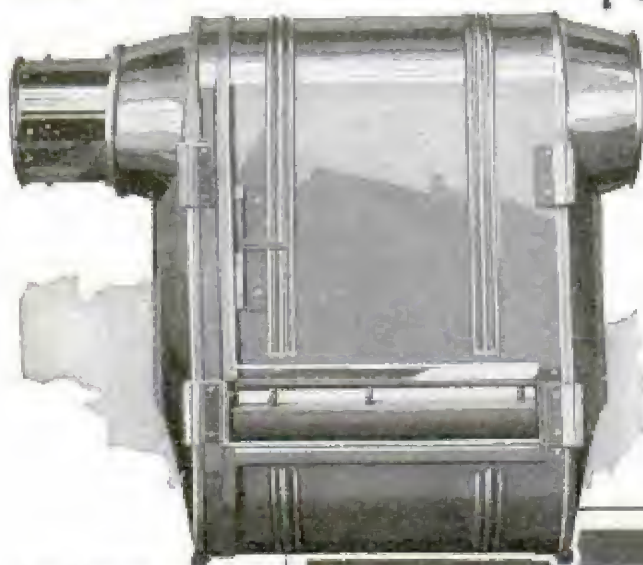
The observers who fly the kites at Dexter, Nebr., the new location of the kite factory, and at the other stations at Ellendale, N. Dak., Royal Center, Ind., Groesbeck, Tex., Broken Arrow, Okla., and Due West, S. C., cannot tell you what next day's weather will be, for their kite brings back only a local report. All the reports, however, are rushed by telegraph, in code,

to the weather-bureau office at Chicago, and here the scattered observations are charted, and with all the ground reports from hundreds of observers, they are analyzed and the weather predictions prepared. Much interesting information, however, can be gathered by watching a single kite flight. The big box may start up in a strong easterly wind, rise a thousand feet or so, and then start swinging around into the south as it catches an air current traveling in another direction.



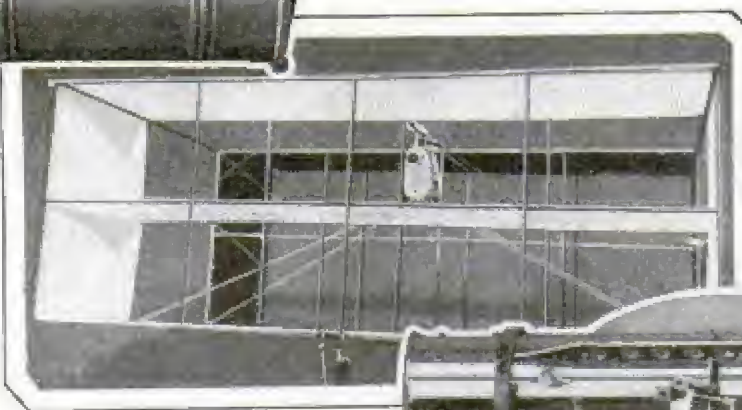
The Government Kite Factory at Dexter, Nebr.; Dahl Baxter, the Kite Maker, Has Made and Flown Them Virtually All His Life; He Produces All Kites Used at the Various Weather Stations

Still higher, it may dash away to another quarter of the heavens, and so on around until it has boxed the compass. It is the observations of such erratic behavior that are especially valuable to flyers who follow the newly inaugurated aerial weather reports. The flyer setting out on a journey can often pick out a favorable breeze which will send him on his way at increased speed, whereas a few feet below or a few above his path may be a cross current, or even one blowing in the opposite direction. A twenty-mile favorable breeze will add twenty miles an hour to an airplane's speed, and a twenty-mile-an-hour unfavorable wind will take off as much, so the difference between two such air strata represents a difference of forty miles an hour in the plane's speed.



The Brains of the Weather Kite; at the Bottom Open to Show the Four Recording Pens; Above, Closed, and in Center, Attached to the Kite

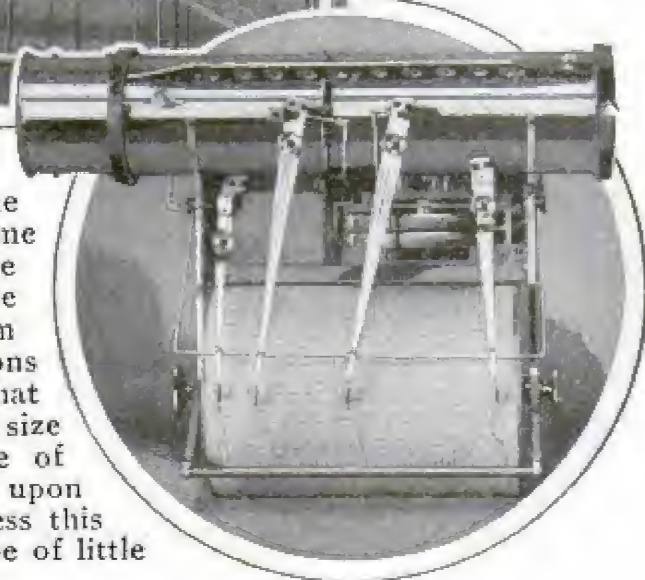
The kite stations do not rely altogether on the big boxes for all their weather reports. At frequent intervals they send up balloons, not unlike the circus-day toy, but much bigger, being some two feet or so in diameter. The balloons are carefully filled with hydrogen gas, and are gauged all the while so that each one of them will conform exactly to all the other balloons which have been sent up in the past, or that will be sent up in the future. The exact size is of great importance, because the rate of ascent and the final height are dependent upon the amount of hydrogen carried, and unless this is always the same, the observations will be of little or no value for weather forecasting.



The balloon is released and goes up, free to wander where it will. On the ground the observer, with a special instrument something like a surveyor's transit but built for aerial observation, follows the course, notes the wind direction at various heights, as indicated by the transit angle, and marks the final level at which the density of the air becomes so slight the balloon can no longer rise. Like the kites, the balloons vary their color according to the background furnished by the sky—white for dark days and black for light ones.

PHOTOS WITH ELECTRIC LIGHTS NEED NO FILMS OR PLATES

1478 Photographs are taken directly on sensitized paper with electric lights, eliminating the use of films or plates, by a process that has been developed in South Africa. It is said to be twice as rapid as the old way and costs seventy-five per cent less. A street scene was taken and printed in little more than three minutes, and an interior view of bottles was developed and printed in two minutes. After the negative is made and developed—steps that require only a few seconds—prints are prepared in a special apparatus in which the image is reflected by means of electric lights through an ordinary bromide paper beneath the lens. The printing paper is then fixed in a hypo bath. The invention, according to reports, is being investigated by the British war office as to its military value.



SIX EXPEDITIONS IN RACE FOR THE NORTH POLE



Map of the Top of the World, Showing Routes of the Various Polar Expeditions Planned for the Coming Summer and the Principal Figures of All But the Secret Russian Group

Six expeditions will take part in a race to the North Pole this summer, and only one of the six will carry dogs and sleds, and those only for use in emergency. Otherwise it will be an all-gasoline race. The United States will have two expeditions in the field, Norway two, France one, piloted by a Norwegian, and the sixth will be a secret attempt planned by the Russian soviet government. The two American expeditions each have an important objective in view, outside the desire to reach the pole, which is to be only a passing point of interest with them. One, starting from Point Barrow, the northernmost spot in Alaska, will attempt to fly from there to Spitzbergen. The main objective is to determine what land may exist in the million square miles of unexplored territory north of Alaska, and if land is found, to claim it for the United States. Passing over the unexplored section, it is planned to fly on over the pole, and down to Spitzbergen, returning to civilization via Europe. The second American expedition, headed by Lieut. Leigh Wade, of round-the-world-flight fame, plans to start from London and try to fly the shortest and most direct route

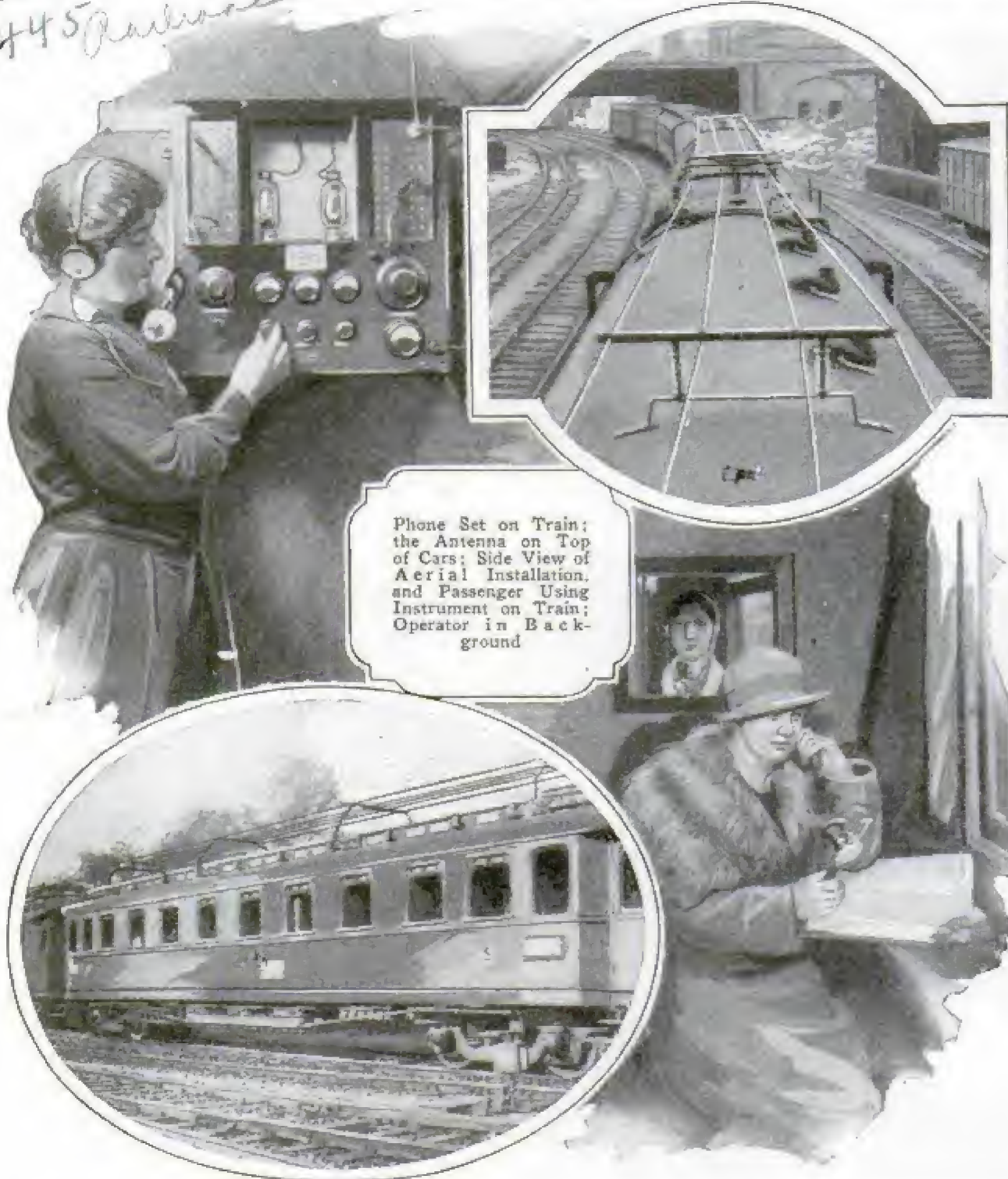
across the pole to Japan. An air route over this course would shorten the voyage from England to the far east by many thousand miles. Roald Amundsen, whose airplane flight to the pole last year failed almost within sight of success, has turned to lighter-than-air craft this year, and will set out from northern Greenland in an Italian-built dirigible. Capt. Otto Sverdrup, another Norwegian, will start from Spitzbergen in an airplane, under the French flag, in an attempt to fly to the pole and return to his base. From Nova Zembla, an Arctic island north of Russia, Lieut. Flaissen, a Norwegian, plans to make the attempt in flying boats, and from the same island the secret Russian expedition is to start. In addition to the polar flights, MacMillan is going north again this year in his schooner "Bowdoin" to search for Norse relics in Greenland.

1563
Sent to the mill by raft, a giant log from the Oregon forests was sawed into 11,000 feet of lumber, a capacity load for the average freight car. The piece was twenty-four feet long and ten and a half feet in diameter. It was cut from the butt and weighed nearly 64,000 pounds.

Eastern and Western
Co's plant.

TELEPHONING BY WIRELESS FROM MOVING TRAINS

1445 Railroad



Phone Set on Train;
 the Antenna on Top
 of Cars; Side View of
 Aerial Installation,
 and Passenger Using
 Instrument on Train;
 Operator in Back-
 ground

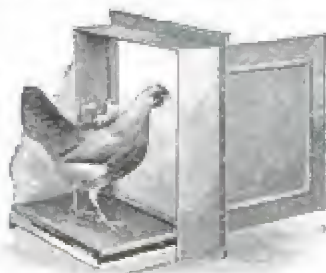
The express train is speeding toward Berlin. "Mr. Brown, you are wanted on the phone, a party calling from Hamburg, sir," says an attendant approaching. Mr. Brown rises, follows to a compartment at the rear of the coach and talks with his friend while the train is moving at a speed of a mile a minute. This is now an everyday occurrence in Germany, where, as a result of some seven years' experimenting, wireless-telephone service is being put into practical use for train passengers. The

system already has been installed in non-stop trains between Hamburg and Berlin, and other installations are soon to follow. The method employed is a combination of ordinary telephony and wireless. Communicating with antennas which are strung on the tops of two cars, are wires strung along the tracks which take the messages from the sending stations, three being used between Hamburg and Berlin. The wireless feature therefore is principally confined to the "jump" between the

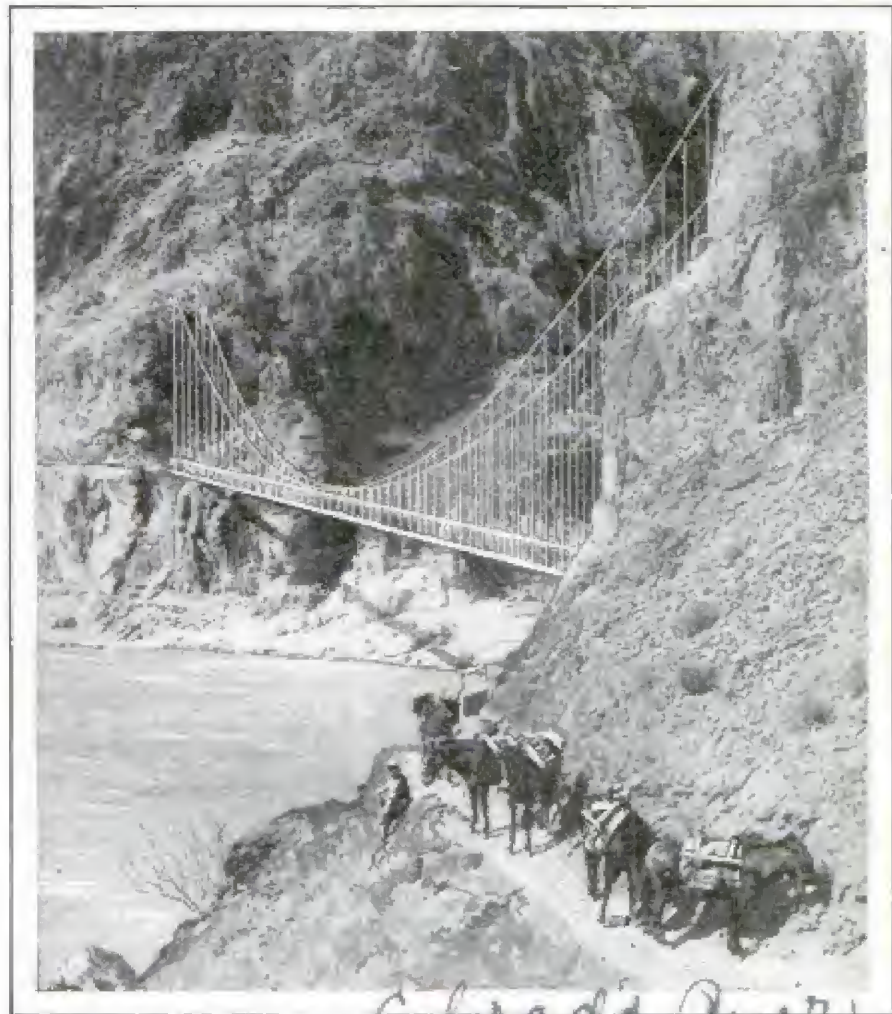
track cable and the antennas on the cars. Messages may be sent from the train as well as received. The apparatus in the car is supplied with electricity from the train-lighting circuit. A system of different wavelengths for different trains and stations permits tuning out. Charges are slightly higher than for ordinary service. A three-minute conversation from Berlin or Hamburg to the train, or the reverse, costs from ninety-four cents to \$1.30, according to the distance. Telegrams are relayed at a cost of seventy-two cents for ten words. When a patron desires to reach a passenger by telephone on the train, the message is received through the regular telephone system at one of the three special stations along the right of way. From there, it is put on the track cable and finally reaches the train. During a demonstration, thirty different calls, necessitating as many connections, were completed in half an hour from the train to show how rapidly the system functions. Besides solving the problem of continually changing distances between the speakers, the difficulty of train noises also has been eliminated. The wireless phone holds great possibilities for train safety, engineers believe.

AUTOMATICALLY LOCKING COOP PREVENTS THEFT 1376

Chicken houses are protected against marauders by an automatic lock, so arranged that the weight of one or more fowls on a tread plate at the bottom of the door opens it. The door then remains ajar until it is closed from within or from the outside by an attendant. As it shuts, the automatic lock secures it until pressure is again exerted on the tread.



*Acakes Mfg. Co.
1. 1st St. Ind.*



Colorado Tour
Suspension Bridge in Grand Canyon Connects Opposite Sides of the Chasm to Accommodate Tourist Parties

FOOTBRIDGE IN GRAND CANYON AIDS TOURISTS

Parts of the Grand canyon that otherwise would be inaccessible to travelers are easily reached by means of a narrow suspension bridge hung between the cliffs of the deep chasm. It is securely anchored and high enough above the water to be out of danger in flood times. The passage is designed to accommodate pedestrians, horses and burros, and is reached by one of the trails leading from the top.

COLORS OF FLOWERS CHANGED 1376 BY COINS IN WATER

To give blossoms cut for exhibitions delicate shades, an English florist drops silver coins in the water in which the flowers stand. Silver hydroxide is formed and the action of the chemical changes the natural color of the blossoms, giving them shadings not possible under natural conditions. After the coloring has proceeded to a satisfactory degree, the coins are removed and a few crumbs of slaked lime or mortar added to "fix" the tint.

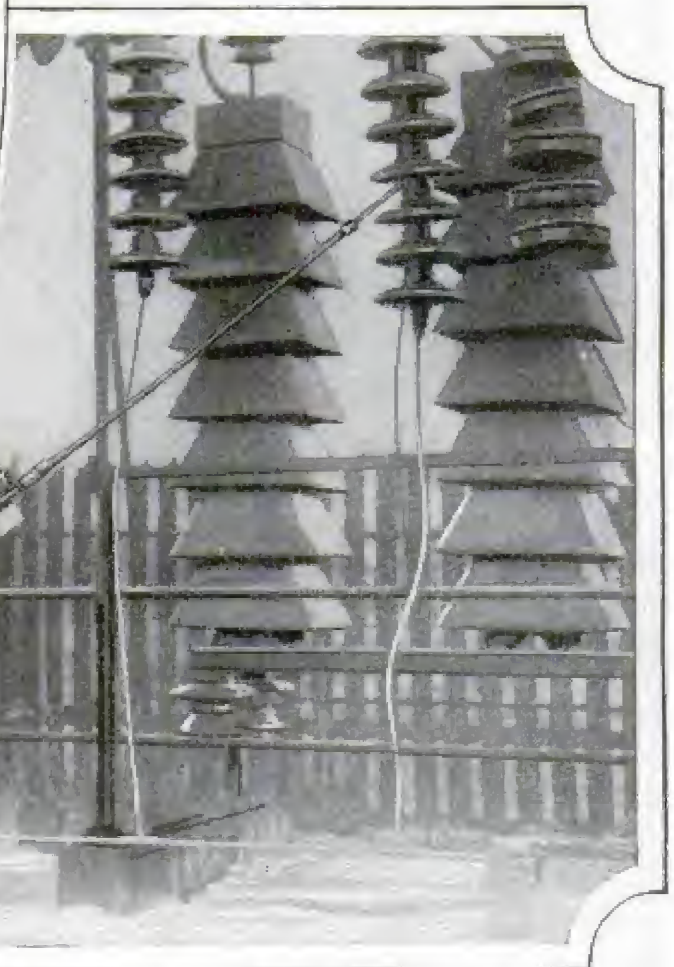
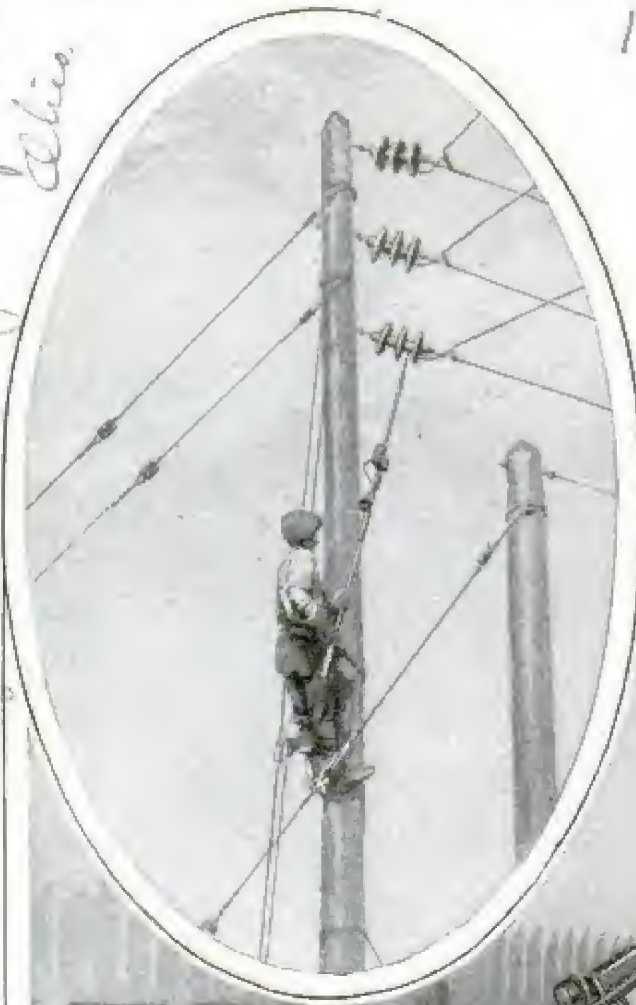
CHEAP WAY TO PRESERVE WOOD SOUGHT IN EUROPE

1469 Seeking a more economical method of preserving wood than by creosoting, a scientist has been sent to Europe from the forest products laboratory at Madison, Wis., to investigate the sodium-fluoride treatment which has been developed abroad. It is said to be less expensive than the creosote process. Due to the increasing shortage of timber, the question of preservatives has become one of great importance, and fully half of all the railroad ties, posts and poles now used in this

country are first creosoted before installation. The railways are by far the largest users of the material, accounting for about eighty per cent of the wood thus treated. Piling for salt water, telephone and telegraph poles, and wood blocks for streets and floors are also subjected to the chemical. In general, the system has increased the life of wood coming in contact with earth from an average of seven or eight years to between fifteen and twenty-five, according to a government expert.

RADIO SET ON HOLLOW STICK TESTS INSULATORS

1412 Testing insulators on power lines can now be done without shutting off the current with consequent interruptions to service, by means of a special radio set attached to a long hollow stick. The instrument is so sensitive that, when placed on a chair for instance, it records the slightest movement of any person near by. The stick is amply protected to shield the user from shock and the outfit may also be employed as a temporary high-tension voltmeter and for making graphic records on power systems.



Testing Insulators with Radio Set on Stick without Shutting Off Power; Readings Are Indicated on Dial in Front and the Tester Itself Is Well Shielded to Protect Person Using It

1469
1412
Chlor Electric Service Co., Inc.
733 Brynson St. Youngstown
Ohio

Uncle Sam Turns Teacher *in the Wilds*

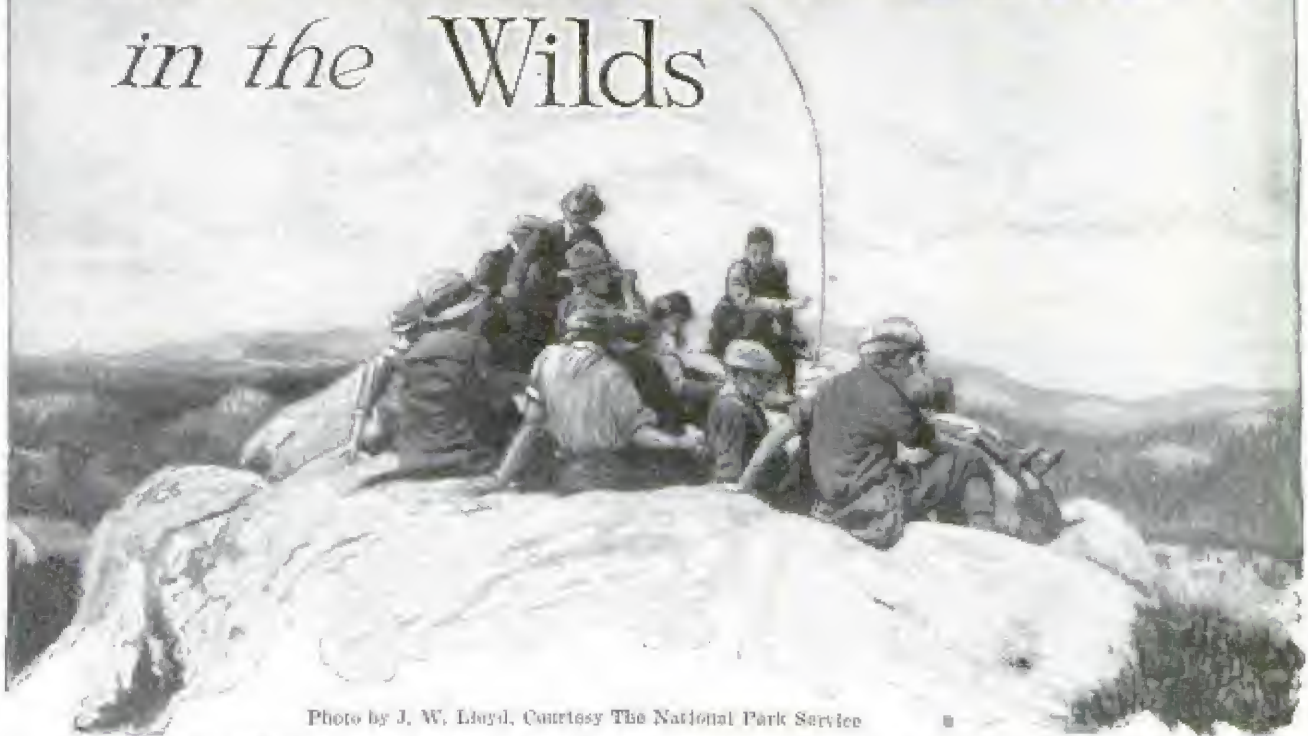


Photo by J. W. Lloyd, Courtesy The National Park Service

Geologist Guide of Yosemite Park Telling a Class of Visitors How Nature Formed the Peak to Which They Have Climbed, and Worked Other Wonders of the Park

A GREAT outdoor university, operated by the government for the people, with a curriculum covering many fields of learning, and a faculty composed of hundreds of scientists, professional men and specialists in numerous branches of learning; that is the newest function of the department of the interior, as described by Secretary Hubert Work in his last annual review.

He refers to the arrangements by which the visitors to the national parks of the west may study geology, botany, engineering, geography, anthropology, zoology, psychiatry, chemistry, ornithology and other subjects at first hand, with field work instead of stuffy classrooms. The open-air university is a result of the changing interests of the millions who visit the parks each summer. No longer content to ride through in automobile stages and view the scenery and wild animals, the growing demand for information about the trees, birds, rocks and other wonders has led to the establishment of trained guides, specialists in each line of work, who conduct outings into the hills and teach direct from nature.

With herds of deer, buffalo, elk, bear and other wild animals almost extinct outside the parks, the government has the greatest resources for a school of zoology on the continent. With vast mountains,

huge glaciers, spouting geysers, hot and mineral springs and other wonders, it is prepared to teach geology at first hand. In the field of anthropology the government has under its control more than 100 Indian tribes, offering living specimens for study of earlier man, or going back still farther, it can present a course based on the cliff dwellers who have left their ruins in the form of prehistoric dwellings, in carved hieroglyphics on canyon walls, mosaics, implements and other handiwork dating back into forgotten ages. Or, going outside the continental United States, the bureau of education controls the Eskimos, Indians and Aleuts of Alaska, who offer another field for the study of primitive man. The forestry service teaches forestation in the field through government control of the wooded public domains, and side by side with it, the visitor may study practical engineering under the experts of the bureau of reclamation, who specialize in land irrigation, location and construction of dams, principles of hydraulics, soil conditions and general questions of land economics.

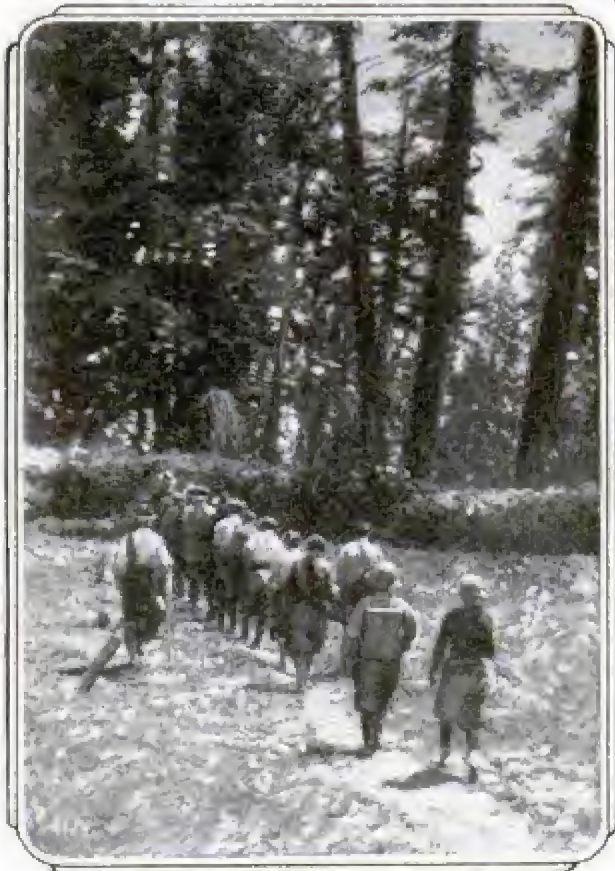
Supplementing the work as demonstrated in the field, the government departments all issue publications covering their work and findings, and millions of these pamphlets are given away or sold at a nominal price through the bureau of

Cont. S. Q. Winters Director National
Bank Bldg. Washington D.C.



Photos by J. W. Lloyd.
Courtesy National Park
Service

Ready to Climb Pinnacle Glacier, Rainier National
Park, in the Background, and Nature Guide with Party
on a Field Trip in Yosemite Park



printing or the departments themselves.
The geological survey, which works in
the parks as well as elsewhere, has gathered
complete information on the rock
and soil formation of the country, on

mountains and glaciers, water supply,
stream flow and other irrigation problems.

The school of chemistry of the department is also operated by the geological survey, with its staff of chemists making analyses in connection with the scientific activities of the bureau. The mineralogists collect rock specimens, study minerals, and finally publish their work for school textbooks, or use of visitors to the parks. Map making and geophysical exploring of geysers and mineral springs, volcanoes and other natural phenomena offer a wide field for study. The Hawaii national park, embracing America's largest active volcano, is one of the greatest geophysical laboratories in the world.

Map making may be learned from at least three bureaus under the interior department. The geological survey is preparing a huge topographic map of the entire country. The general land office surveys and publishes maps of all the public domains, while the bureau of reclamation specializes in maps and other data covering the development of reclamation projects.

ANCIENT INDIANS HAD BUTTONS EXPLORER FINDS 1443.

Among relics found not long ago in the Mesa Verde national park was a button carved from jet, about seven-eighths of an inch in diameter and with a turquoise-inlaid center. It was perforated with two holes, as though a sinew or cord had been drawn through and the piece worn as an ornament rather than used as a button of today. But these articles were first considered as decorative in almost all countries where they have been found, so that this Indian button is regarded as one of the earliest yet discovered. The Mesa Verde was inhabited by tribes of doubtful origin and antiquity, but the settlements were abandoned before the days when the early Spanish adventurers explored the region. Other articles found here include a large cooking jar with a sandstone cover, bone awls and scrapers, and a large water jar decorated in black and white and reinforced with fiber.

GAUGE FOR FITTING GLASSES INSURES ADDED COMFORT

Accurate measurements of the nose, distance between the pupils of the eyes, width of the forehead and other dimensions essential to a proper fitting of spectacle bows are quickly and correctly made with a sliding gauge now on the market. It is ruled for both inches and millimeters and elimi-



Measuring Length of Temples, Distance between Them and between Pupils, and Bridge of Nose for Glasses

nates all guesswork as to the proper sizes. The instrument is said to assure not only a comfortable fit but prevents further eye troubles by securing exact adjustment.

☐ In India, hailstorms are frequently so severe that persons are killed.



When Coin Is Dropped in Slot, Apple Slides Down Spiral and Falls into Cup Outside

COIN-IN-SLOT APPLE VENDER KEEPS FRUIT CLEAN

Encouragement is given to the healthful habit of eating apples, and the fruit is protected from dust and dirt, in a coin-in-slot vending machine devised by a western inventor. The apples are placed on spiral holders within the cabinet and when a coin is dropped, the lowermost apple falls into a cup below, opening the trap by its own weight, and when the fruit is removed, the cup closes. Other firm fruits also may be dispensed in the apparatus.

MOSQUITO-REPELLING MIXTURE —GIVEN TWO-HOUR TEST 140

To demonstrate the efficiency of a mixture he prepared to repel mosquitoes, an eastern professor stood exposed to the insects for more than two hours while they were alighting upon him at the rate of from five to twenty a minute. The substance is composed of ordinary insect powder mixed with cold cream, vaseline or face powders, about fourteen parts of oil or extract being used to ninety-four or ninety-six of vaseline or cold cream.

408
Apple Vender
I saw Michael L. Radlinger
on Waco St. Portland Ore
Mr. William Andropoulos
Chicago Ill.
New Brunswick N.J.

Gullemann Optical Co
514 10th St. N.W.

1569 974
 274
 Frigate Constitution, Hartford, Cumberland
 Cruiser Oregon, Cruiser Chicago, Brooklyn
 EVOLUTION OF U.S. BATTLESHIPS SHOWN BY MODELS
 After—Arcades—Tennessee

Secretary of Navy Wilbur
 and Admiral E. B. Eberle



Secretary Wilbur and Admiral Eberle, Chief of Naval Operations, Examining Collection of Battleship Models That Shows Stages in the Development Leading to the Modern Dreadnaught

How the modern American warship has developed from the slow fighters of the days before the Civil war to the swift steel craft of the present is illustrated by a collection of models at the navy department in Washington. The "Tennessee," one of the latest superdreadnaughts, is shown in replica as typical of war vessels of the most modern kind, while old styles are depicted in models of the "Merrimac" and the frigate "Constellation."

PLANS FOR CATHEDRAL FORESEE HEATING BY RADIO

Builders of the cathedral of St. John the Divine in New York city are making allowances for probable developments of the future in erecting the huge structure. In planning the heating system, for instance, the engineers have taken into consideration the possibility that within fifty years or so heat may be supplied by electricity, possibly by radio, and for that reason the conduits have been made of extraordinary size. The main ones are of fiber, three inches in diameter. This will permit alterations in the wiring without disturbing or defacing the masonry, and as far as the architects know,

it is the first time that fiber conduits have been used in building construction although they have been employed on underground jobs where metal ducts could not well be used. The units are surrounded with concrete and in case the fiber deteriorates, the channels left in the cement would serve the same purpose. Great care is being taken with the roof drain pipes. Instead of having the water drip from the open-mouthed gargoyles, it will be brought down inside the walls, and to avoid damage by freezing and clogging of the pipes, a device will be installed at the mouth of the gutters so that live steam can be turned on to melt ice and snow.



AXLE-GEAR PULLER FOR AUTOS HELPS REPLACE GEARS

Removal or replacement of axle-shaft gears on small automobiles is simplified with a compact unit that serves in place of the regular arbor press for work of this kind. The top consists of a single heavy drop-forged piece and has a center screw with a hole in the end so that the operator can use a bar in forcing out the shaft. The press can be fastened securely to a bench to afford ample leverage and the unit also may be utilized in pressing bushings in and out of other small gears.

Axle-Gear Puller in Use, Illustrating How It Is Clamped to Bench and Operated with Bar

National Machine and Tool Co. Jackson

SEEKING EXPLANATION OF SWALLOWS' MIGRATION

Where do chimney swifts go in winter? The department of agriculture is seeking further light on this question by capturing some of the birds and placing bands on them so that, if they are caught during the winter months, a clue may be afforded as to their migratory habits. The swifts fly south as cold weather approaches and are believed to spend the winters over the forests of Central and South America in the dense foliage of the tall trees. The method of banding birds was started as early as 1803 by Audubon, who placed silver threads around the legs of a brood of phoebes. In 1899, systematic work was begun. Most of it has been done by voluntary helpers. There are now nearly 1,000 trapping stations in the United States and Canada, where the birds are captured, banded and then released, reports being given to the biological survey of the department of agriculture. Last year, some 65,000 birds were banded by this system. Few are injured and most seem to be little frightened by the traps. A story is told of a brown thrasher that formed the habit of going to sleep in the snare while awaiting release. To operate a trapping station, it is necessary to obtain a permit and a supply of bands. Instructions are given by the biological survey as to the best type of trap to use and the proper way to handle the birds. Occasionally, the trappers aid enforcement of the laws. Anyone killing a bird bearing a biological survey tag is requested to report immediately to the bureau, giving the number. A hunter, having shot a duck, sent in the date on the tag as December 30, but investigation showed that the bird had not been labeled until January 12, and the hunter was fined \$25 for shooting out of season. To further the work of banding, four large co-operative associations have been formed, embracing the United States and much of Canada.

Alaska's placer-gold reserve is estimated at 360 billion dollars.



Rear and Front Views of the Automatic Trumpeter in German Museum; It Has Blown Its Blasts for 100 Years

DUMMY THAT PLAYS TRUMPET IS OVER CENTURY OLD

1451

Built in 1810, a mechanical trumpeter, now part of the acoustic exhibit in the German museum at Munich, still gives clear and realistic tones and is in an excellent state of preservation. The notes are produced by a mechanism somewhat like that of a music box. The workings being entirely concealed from the front, the illusion is nearly perfect.

LOG DISK FOR RADIO RECEIVER HAS THREE DIAL SPACES

1415

One of the types of dial disks for recording the positions of different stations as they come in over the radio receiver has spaces on which to mark the readings for three dials besides another space for the call letters and wavelengths of the stations. The disk consists of three separate pieces but all are operated as a unit.



Built by Friedrich Kaufman

Save Haute Advertising

HULL OF PLATES AND SPRINGS TO PROTECT SHIPS

Intended to make ships unsinkable, a model hull devised by a California sailor consists of a series



Inventor with Model of Proposed Flexible Hull for Vessels; the Plates Are Fitted with Springs

of heavy springs faced with steel plates. They are so arranged that the force of a collision would be taken up within a limited area, before it could spread to other parts of the hull, and damage would be confined to a small portion. The bottom is likewise protected and is fitted with compressed-air compartments.

COAL SEEN AS SOURCE OF FOOD AND FUEL FOR MOTORS

Research will provide a synthetic food from coal when needed and abundant synthetic fuels for motors long before the natural oil deposits are exhausted, in the opinion of Prof. James F. Norris, president of the American Chemical society. The Germans prepared food from coal during the war, he points out, and fats were made from petroleum. While these accomplishments are regarded as chiefly of interest to the scientist, they suggest a practical solution of food and fuel shortages, should these emergencies arise, and indicate, Prof. Norris holds, how ably chemistry has aided man in times of need. In considering predictions that the popu-

lation of this country will have reached the saturation point in a few decades, the professor believes that chemistry has not been taken sufficiently into account. Food supply will never become an acute problem, so long as we have chemists, Prof. Norris declares. He shows

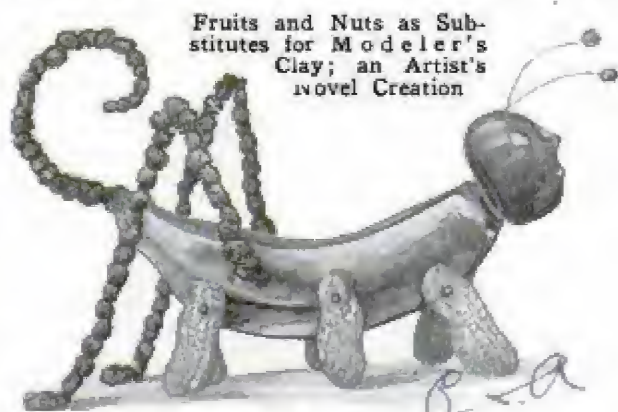
how the threatened nitrate shortage was prevented during the World War and points to the tropics as a great source for many foods and industrial products of the future. From the luxurious plant growth in those regions, he predicts that chemists will be able to make motor fuels. Among the recent triumphs of chemistry are the preparation of ammonia from the air, synthetic alcohol and dyes from coal, perfumes and extracts, unexcelled in nature, and artificial silk.

RAILROAD TIES OF SOLID EBONY DRILLED FOR DRIVING SPIKES

Using solid ebony for railroad ties seems to indicate extravagance but since the wood flourishes in forests near a line being built from Alpine, Tex., to Marquez, in Mexico, it has been employed for the purpose. The wood is so hard that holes must first be drilled into it before the spikes can be driven through. The ties are dragged in from the mountains with burros, and it is believed that they will last for generations.

MODELS IN FRUITS AND NUTS EUROPE'S LATEST CRAZE

According to reports, European studio circles are reviving the old-time sport of modeling animals, insects and other creatures from fruits and nuts. One artist's

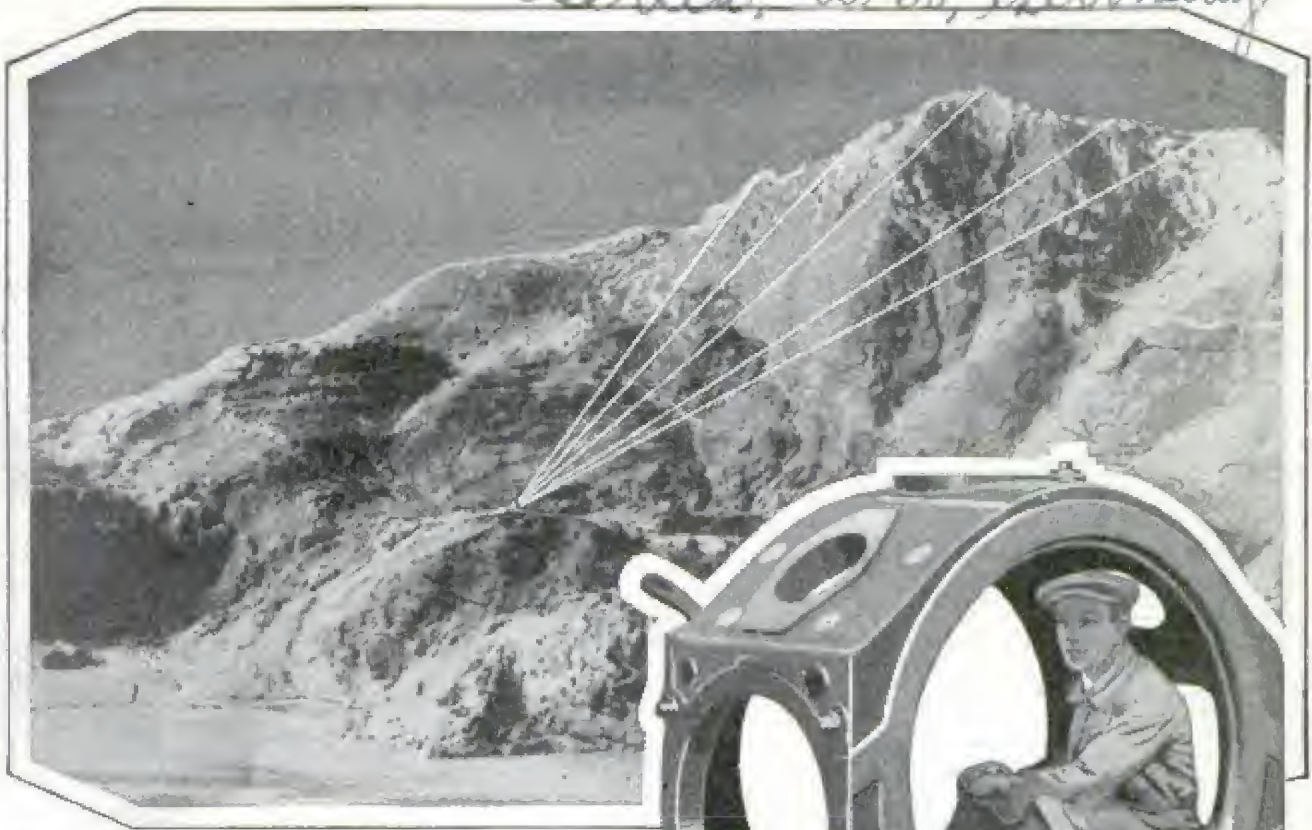


Fruits and Nuts as Substitutes for Modeler's Clay; an Artist's Novel Creation

work has a banana for body, peanuts for legs, a chestnut for head and hindlegs of dried currants.

Massachusetts Institute of Technology

1911
Herzogenstand, W. 30, Germany
new Winterfeldstr. 24



Radio Antenna Anchored from Station Site to Peak and One of the Huge Transmitter Units

PEAK SERVES AS RADIO MAST FOR GERMAN STATION 1417

The antenna for a 1,000-kilowatt radio station being erected in southern Germany in the heart of the Bavarian mountains, is fastened at one end to the top of a peak, Herzogenstand, over 5,500 feet high. There are five strands in all with a total length of more than 8,000 feet which have now been hung for more than a year to determine if they could withstand the storms and snow burdens of the winters. The test has proved successful and work on the station, which will be used for commercial purposes to link Germany to the heart of Asia, has started. The transmitter is of the type that produces oscillations by an electric arc. The chamber of the unit in which the arc is to be burned is large enough to hold a man.

COTTON SEED TO RIVAL MEAT AS FOOD, CHEMISTS SAY 1421

Properly prepared, cotton-seed meal can be converted into a cheap nutritious substitute for meat, according to an eastern expert. He declares that the protein value of the product is almost equal to that of beef, while its cost is only about one-thirtieth as much. The meal is now used chiefly for cattle feed. It is the residue left after pressing out the oil, which

amounts to forty-five per cent of the seed, and contains, on an average, forty-three per cent of protein. From this year's cotton crop it is estimated 7,870,000 tons of seed will be extracted. Nearly 5,550,000 tons will be crushed for oil. This is refined into salad oils and lard substitutes, and is used for various industrial purposes.

BALL GLOVE WITHOUT BUCKLE IS QUICKLY FASTENED 1347

Interlocking fasteners, of the kind that have appeared on galoshes and tobacco pouches, are now being used on catchers' baseball gloves. They are operated in the same way and the player can easily close them with his free hand. A better-fitting glove is said to be the result of using these fasteners, yet free movement of the wrist is permitted.



Daily News
2/26/26

American Chemical

Ken. Wal Sporting
1011 E. 1st St. St. Louis

Brought to you by
Leo J. Gallagher
 978
Gurser. S. Manchuria
GUITAR WITH TWO STRING SETS
PLAYS MELODIES AND CHORDS

1524
 Besides playing the accompaniment, a double guitar also carries the melody. This is accomplished by means of two sets



Both Melody and Accompaniment Are Played on This Guitar Equipped with Double Set of Strings

of strings. The instrument has a peculiarly curved neck so that the extra strings, three in number, are within easy reach.

1560
CITY NOISES CAUSE BIGGER EARS
SCIENTIST DECLARES

Mr. J. H. Puffer.
 Basing his assertion on measurements of his patients' ears for more than thirty years, a Vienna specialist declares that the din of modern city life is producing a race of large-eared men and women. They are needed, he says, to catch the spoken word from the clamor, the principle back of the alleged change being that an organ is strengthened and enlarged by frequent use, while lack of use tends to cause it to dwindle. Scientists declare that the muscles of the human ear once were much more developed than at present, for it was possible to turn the ears toward a sound rather than cup them with the hand as is

POPULAR MECHANICS

now done in many instances by the hard of hearing or when a person wishes to catch a distant sound. The elephant's muscular development around the ear is held to illustrate this principle of adaptation. These huge jungle beasts have need of the aid to receive the signals of their kind from afar and to get warning of approaching enemies. Those who differ from the Vienna doctor point out that the need today is not to hear more but to hear less, and that not all city sounds are increasing in intensity. For instance, sound measurements in New York showed that a horse makes more noise than an auto.

1471
PROTECT 'TRENCH OF BAYONETS'
WITH CONCRETE CANOPY

To preserve one of the most tragic monuments of the World War, the "Trench of Bayonets," in which a number of French soldiers were buried alive when their trench caved in, a concrete canopy has been erected over the spot. The protruding bayonets, mute evidence that the unit was about to go over the top when the earth engulfed them, are decorated from time to time, and the scene is visited by scores of tourists. Building the canopy was a detail of reconstruction work in the war-torn areas, some of which have been restored almost to pre-war condition. Verdun, for instance, has been almost entirely rebuilt during the interval since the ending of hostilities.



W. H. H. H.
 "Trench of Bayonets" Shielded by Concrete Canopy



Daring Explosive Specialist, Who Blows Out Oil and Gas-Well Fires with Special Mixture of Nitroglycerin, Wearing the Asbestos Suit and Helmet in Which He Works While Planting Blast

By ^{Mrs.} ANNIE DYER NUNN,

702 Jackson St.
Amarillo, Texas.

OUT in the Amarillo-Panhandle oil field, in Texas, the flames of a burning gas well were reaching a height of 200 feet and consuming 140,000,000 cubic feet of gas a day.

Near the fire a man was walking about calmly taking inventory of the situation. It was Tex Thornton who is engaged in one of the most unusual and dangerous occupations known—that of extinguishing gas and oil-well fires by means of nitroglycerin.

Some seven years ago, in Ohio, he began as a student with a torpedo company. A year later this company sent him to the oil fields. He has been shooting wells to bring them in for fourteen years, but only during the last five has he been extinguishing fires. He is called to all parts of the country and has put out fires in seven different states and in Mexico. He keeps a string of five automobiles for his business. These are equipped with special shock absorbers, racks for shells and a box for explosives. No matter what distance Thornton has to go to a fire, he always goes overland—this in order to take his shots, for the railroads will not carry them.

If he has any fear of nitroglycerin he does not show it. He knows just what it will do, he says, and all about managing it; but this does not alter the fact that from the moment he loads it on his car

and sets out for a fire, until that fire is out, his life is in constant danger.

Thornton makes his own explosives in his factory which is situated in a canyon, nine miles from Amarillo. He employs two engineers to assist him, but does all the mixing of the chemicals himself. This work is interesting and clean—everything about the factory is immaculate. The mixing is done in marble vats. Enough explosive is mixed at one time to last two or three months—depending on the number of fires, of course.

"There are many sources of fire," he informed me, "but the most frequent one is lightning. We count on one fire a month from this source; but sometimes there are three or four. Friction is another source; hot boilers another. In still and cold, or very damp weather, gas will travel along the ground to a boiler as far as a hundred feet away, where it ignites and shoots like a rocket back to the from which it came."

"The first fire I ever attempted to extinguish was in East Liverpool, Ohio. I was several days at it, but the next one, which was much larger, required only a short time. I put out a fire here in the Panhandle in two hours and forty minutes; but, ordinarily, it takes from one to four days. Of course, most of this time is spent in preparation for the actual shoot-



Courtesy Murry Watt Studio

Just After This Picture Was Taken, the Shot Dropped down the Casing, Wrecking the Derrick

ing. There is water to pump and wreckage to move. All irons must be got away from the well; otherwise, being red-hot, they will ignite the well again.

"Removing the wreckage," he continued, "is not as easy as it sounds, especially from a gas well. Ignition of gas wells starts at the top, thus burning the derrick before it falls, leaving the irons to drop

at the place at which it stood. An oil-well derrick burns after it falls. After the wreckage is cooled by water, it is drawn away by means of a windlass. I stay at the fire and attach the cable to the irons. Some of the time I wear an asbestos suit; but it is difficult to work in, being very stiff and clumsy. So, generally, I wear ordinary working clothes with heavy undergarments and socks. When all the irons are out, I am ready to prepare for the shot. Two twenty-foot posts are placed on opposite sides of the well, 180 feet apart. An asbestos belt runs from one to another, and right by the well. On this belt, I slide the shells containing the explosives to the fire and leave them. Then I go to the post from which I started, and by means of a pulley, swing the shots into the fire at the moment I set them off by electricity, by pressing a button with my foot. The force of the explosion is so much greater than the force of the gas that the fire is blown out, in exactly the same way that you would blow out a candle light. People ask me why I do not let the fire explode the shots. This would not be practical because a part of the mixture would burn up before the explosion which

would not take place under thirty or forty minutes.

"These big gas wells certainly make fierce fires," said Thornton. "As you know, you can hear them roaring for a long distance. And at night it is possible to read a newspaper, by the light of one of them, as far as a mile away. At times I have considerable difficulty in shooting



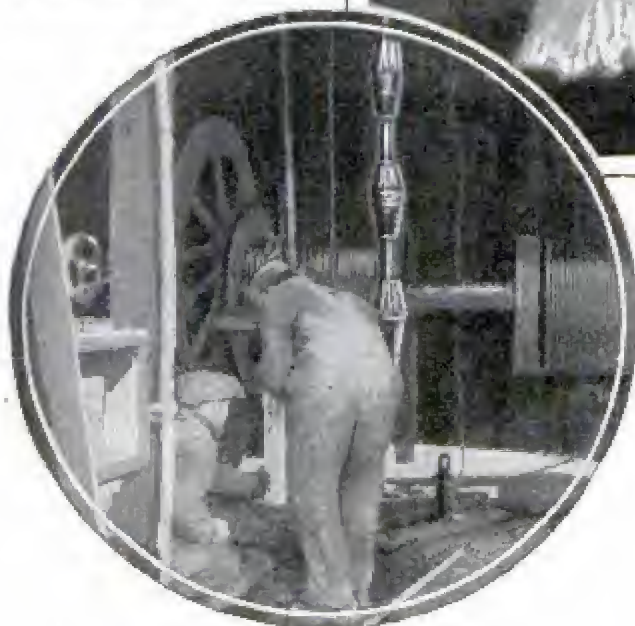
An Oil-Well Fire as It Looks by Day; at Night the Countryside for Miles Is Lit Up by the Glow, and Frequently the Blaze Rages for Many Days Before It Is Conquered

a fire. In one case, two thousand people had gathered to watch me, and the company, rather than have them disappointed, persuaded me to shoot the well before I was ready. Because the asbestos belt was too slack, the first shot was carried up by the fire and thrown off to one side where it exploded. The same thing happened the next time. The third time I got the fire out; but it caught again from some hot irons fifty feet away. I saw the fire flash like a bolt of lightning to the well and I tried another shot. This time the fire was out for good. I was once retained at a well for a period of not less than eleven days, awaiting the outcome of the bridle-and-steam method of extinguishing the fire. Owing to the fact that this well was in a crowded field, it was not practical to use nitroglycerin except as a last resort. The steam finally prevailed.

"Nitroglycerin shooting is much quicker and less expensive than the bridle-and-steam method. It would require at least three weeks, using thirty men and fifty boilers, to put out one of these big fires here in the Panhandle."



Thornton Loading Five Quart Cans of Nitroglycerin in Special Padded Compartments on His Car; a Well Fire Just Before He Blew It Out, and, Below, Planting a Shot to Bring In a Well

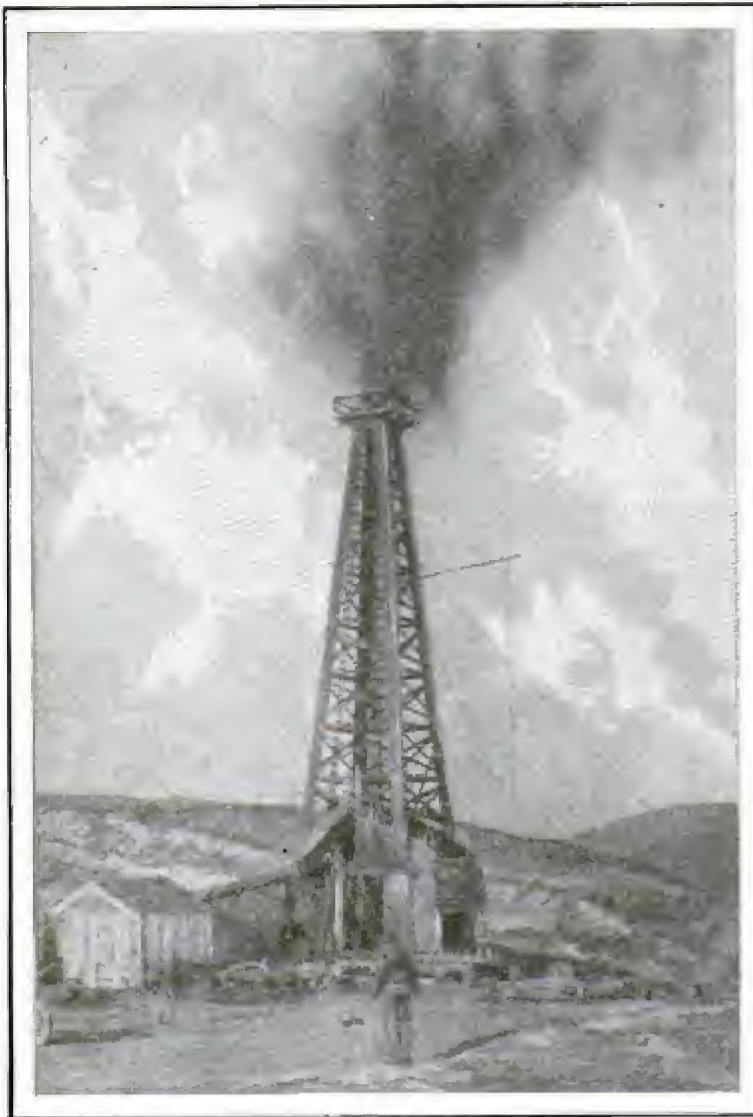


"What do you consider the closest call you ever had," I asked.

"The closest? Well, let's see," Thornton replied, "I have had lots of close calls, you know. I think the closest was when I was shooting a well at Artesia, N. Mex., to bring it in. I had put three shells, each holding thirty quarts of nitroglycerin, into the pipe. But it was not long before I knew that those shells were not going to stay in the

well. They were coming back up—I could tell by the sound. There was one chance in a thousand that I would not be blown to bits; for there was no time to run. My only hope was to stand at the pipe and catch the shells as they came to the top. And I did. As they shot out of the pipe, I caught them, one by one, and set them down on the ground.

"A fire at Powell was one of the hardest I ever had. The oil had flowed all over everything and, not only the well, but the whole face of the earth seemed afire. For 500 yards, a near-by creek was a raging



Bringing In an Oil Well; the Column of Gas and Oil, Shooting High above the Derrick, Frequently Is Ignited by Friction

sea of flames. Of course, all the fire surrounding the well had to be put out before I could begin on the well itself.

"The creek came first. I used five shots, stringing them at intervals of 100 yards. They were dropped through the fire and into the water to the bottom of the creek. Then wires extending from my switch were attached to them—one for each shot. I set the shots off, one at a time, in rapid succession. That was some explosion; water, dirt, fire and oil shot in every direction. Every window pane in Powell was broken, but the fire was extinguished."

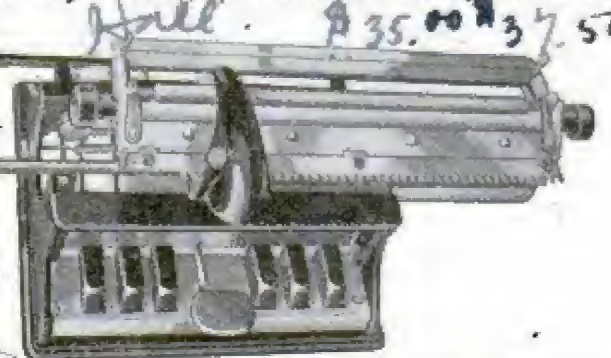
1605 ROWING INVENTIONS TO LESSEN STRAIN AND GIVE SPEED

Broken records, the distinguishing feature of almost all kinds of sports these days, are promised in rowing as a result of aids devised by an eastern coach. They include a sliding, ball-bearing oarlock, a rocking footrest and a pneumatic seat pad. Rowing is called the "most punishing" of

all college sports and the most scientific. The coach's inventions, designed to remedy some of the imperfections which have prevented thoroughly efficient performances, are expected to save energy which, translated into speed, will result in a gain of at least twenty-five boat lengths in a two-mile stretch. The rocking footrest is intended to remove much of the leg strain that now attends rowing and allow the oar to be kept in the water for a longer time, so that the shell can be driven approximately three feet farther at every stroke. The oarsman's slide is also lengthened from ten to twelve inches with the device. The new oarlock has been designed to afford a right-angle pull for the development of greater power and to minimize twisting the body. The oars are to be thirteen feet long, a foot more than the present styles, affording about ten per cent more power. The pneumatic seat, it is expected, will remove, to a great extent, the friction which results in chafing and infections that often hamper the success of the crews.

TYPEWRITER FOR BLIND PRINTS RAISED DOTS

As an aid to the blind, a typewriter that embosses the paper with groups of raised dots to conform to the two special writing systems for the sightless, Braille and New York point, has six black keys like those of a child's piano. The dots are made by a set of minute punches and dies at the back of the machine, more than fifty combinations of the six keys being possible so that, besides

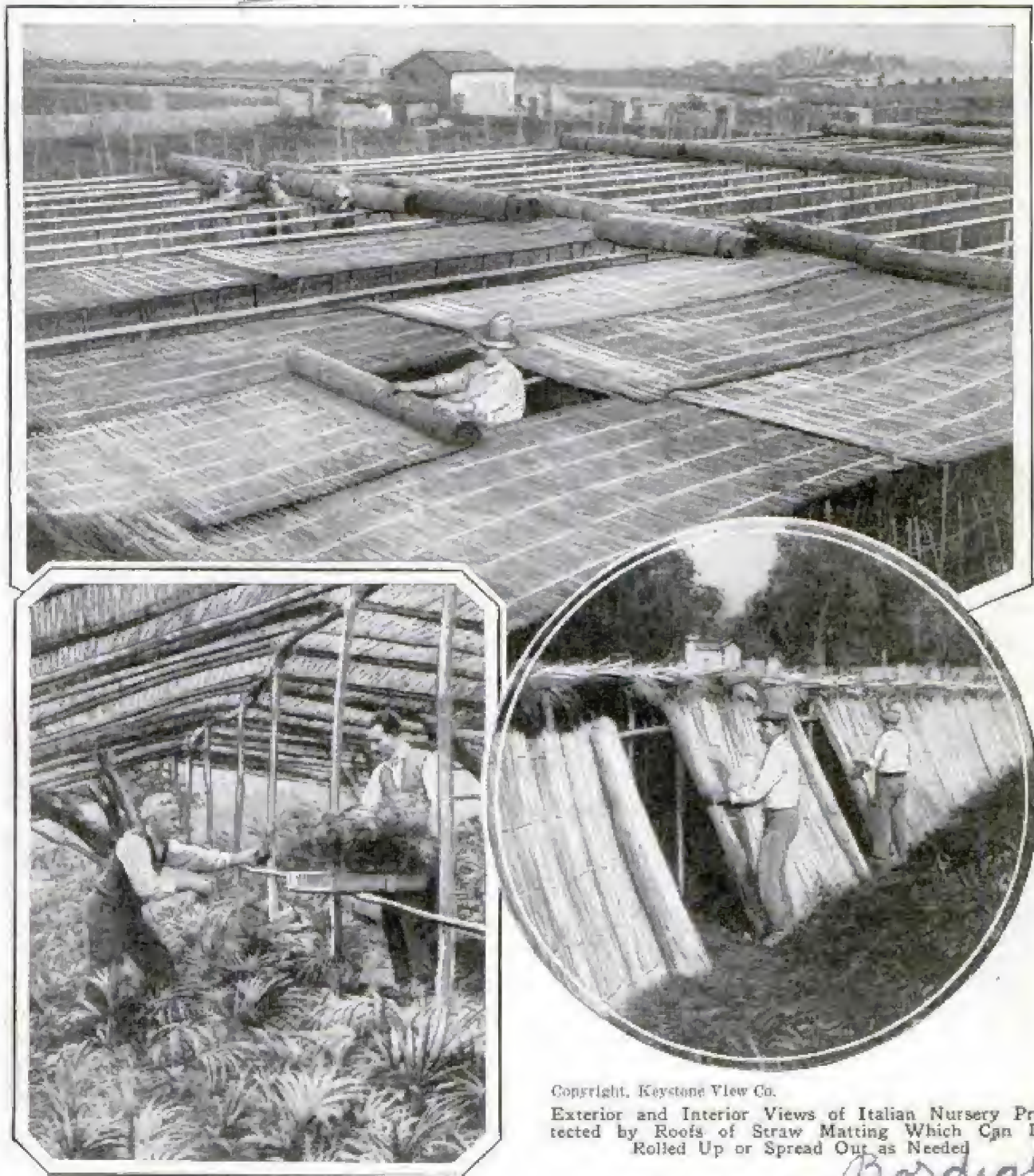


Typewriter on Which Blind Can Prepare Special Printing; It Has 220 Parts and Produces Fifty Symbols

the alphabet, other characters can be made. If all six keys are depressed at once, six dots are embossed on the

Clavin & Co. 210 S. Main, Jacksonville, Fla.
Hall 35.00 37.50
Comp. Engineering and Mfg. Co.

GLASSLESS GREENHOUSES COVERED WITH STRAW



Copyright, Keystone View Co.

Exterior and Interior Views of Italian Nursery Protected by Roofs of Straw Matting Which Can Be Rolled Up or Spread Out as Needed

Bordighera

heavy paper used in the machine. This group of dots, or full "cell" as it is called, forms the basis of the system. The typewriter has margin adjustments, paper release and other features of an ordinary outfit, but is arranged with the greatest simplicity for ease of operation, although it contains 220 parts. The blind translate the dot symbols through their sense of touch. Besides the typewriter, a machine somewhat like a linotype prepares brass plates which are used for embossing books for the blind.

Flower gardens in an Italian nursery district are protected from all kinds of unfavorable weather by roofs or coverings of straw matting. This may be rolled back to admit sunshine or quickly spread out when it is necessary to shield the plants from heavy rains or other storms. The covering, which is supported on rails and uprights, is also regularly used to protect the plants in the night time.

¶ Figures gathered for February from 100 American cities show that autos were involved in the death of thirty-five daily.

1356



View of Miami Harbor from Airplane; near the Center Is the Wrecked Ship Which Blocked the Entrance; to the Lower Left, a Dredge Is at Work on the New Channel

HARBOR BLOCKED BY WRECK OPENED WITH DREDGES

Failing to dislodge a ship which overturned and blocked the entrance to the harbor at Miami, Fla., engineers proceeded to cut a new channel around the obstruction with dredges. Sand was scooped out and piled up in a temporary bank while the ditch was being dug. It is estimated that the blockade and delay to shipping cost many thousands of dollars.

ELECTRIC SHOCKS FOR CROPS FAIL TO INCREASE YIELD

Since the yield of crops was not materially increased by electrical treatment, experimentation along this line will not be continued, according to officials of the department of agriculture, where attempts have been made to force plant life by electric shocks. A charged network was placed high enough over the growths to permit cultivating them with horse-drawn implements, and for hours at a time, and over a period of three months, the electricity was turned on, in most of the tests, the potential of the wire network being

approximately 50,000 volts. The plants received about 655 hours of electric treatment in all. In only one of the ten separate trials did an electrified area show a substantial increase in yield, as compared to an untreated part. Similar experiments in England are reported to have resulted in larger crops.

COOKING BURNER FOR CAMPERS HEATED BY AUTO EXHAUST



Motorists can cook their meals with little trouble on a simple outfit that is fitted to the exhaust manifold of the auto engine. A small valve placed in the exhaust pipe directs the heat into a burner with circular ribs that keep the flame from "jumping." Pots and

pans specially made to fit the cooker are supplied if so desired.

no information available

comb. Edvarda May 965 of Goodlam Ave. Letter recd. 5/21/26

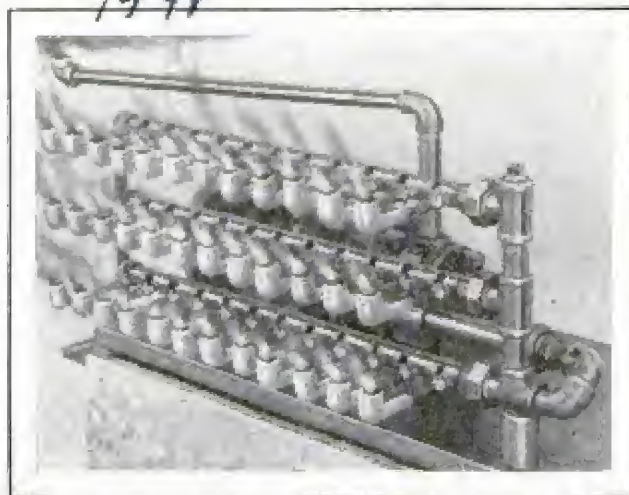
1552.

MYSTERIOUS ORGANISM EATS DISEASE GERMS

Experiments that may have a far-reaching effect in medicine and sanitation have been conducted at the university of Wisconsin with a mysterious something known as "bacteriophage." Whether this is a chemical or a living organism is not known, but scientists at the university have discovered that it devours one of the deadliest kinds of bacteria, a variety that causes one of the worst kinds of blood poisoning and is a factor in scarlet fever and one of the most severe types of pneumonia. Cultures of the germ grow vigorously in test tubes and make the nutrient fluid cloudy, but introduction of a small quantity of the bacteriophage made the culture clear again, due to the destruction of the disease germs. This clearing up was accomplished in thirty-six hours in laboratory tests. Some scientists claim that this mysterious bacterium "eater" is a living organism, but if so, it must be exceedingly small for it has never been seen even with powerful microscopes, and it apparently passes through the pores of porcelain filters. It is not killed by high temperatures.

AUTOMATIC SMOKER BREAKS IN THIRTY-SIX PIPES AT ONCE

Thirty-six pipes are broken in at one time in an automatic smoker used by a western factory. The bowls are filled with tobacco and the stems inserted in a suction rack. This apparatus insures a sanitary article and spares the smoker the tribulations of breaking in the pipe in the usual way.



Pipes on Rack Being Broken In for Users; Suction Apparatus "Smokes" All Thirty-Six at Once



Scraper for Sand Golf Course in Use and Close View of Clips

SAND GOLF COURSE SCRAPER FITS ON PUTTER

Golfers whose courses have sand instead of grass greens are served by a scraping attachment that can be carried in the club bag when not being used and fits on the putter when the green is to be cleared. It is a blade of wood with an adjustable steel clip for fastening to the club and another for securing it to the bag. This

saves the time and inconvenience of using larger scrapers that are sometimes provided at the greens. It is quickly put on or removed and smooths the green for best results.

☐The intensity of light from the full moon is approximately 100 times that of the light from all the stars together.

Dr. L. O. Dutton, Methodist
Hospital, Memphis, Tenn.
Mr. Judson D. Brady,
Arkansas City, Kans.

Wm. M. Linkman & Co.
Chicago

708



ON a hot Monday afternoon in July, 1921, Babe Ruth swatted a baseball so hard that it traveled over the center-field fence of the Detroit ball park for the longest recorded hit ever made in the big leagues.

When Babe struck the ball, Harry Bul- lion, of the Detroit Free Press, saw it hit a small shed on the other side of the fence. He calculated that if it had not hit the shed it would have traveled 590 feet from the home plate. While this is the nearest to an official record for distance we have, there are many other fans who insist that Ruth hit a ball farther at the Polo Grounds in New York city and others who say that he hit one a greater distance in Chicago. There are some who will vouch for the fact that he has driven a baseball over 600 feet in practice games.

The many long hits which have been made since 1920 have caused the fans to believe that the modern baseball is quite a bit livelier than it was in the old days. When the manufacturers deny that this is true, the average fan sticks his tongue in his cheek and crosses his fingers and toes. One might just as well tell him that there really is a Santa Claus. One fan said, "The club owners want the ball to be lively. Hitting is what makes the game popular."

Suppose that this fan is right and that the manufacturers of baseballs did want to make a livelier ball. How would they go about it? In general, they could do it in two ways: first, by using a different quality of materials in the manufacture of the balls; and second, by winding the woolen yarn tighter around the rubber or cork-and-rubber center.

The first method may have considerable influence upon the liveliness of the ball. A

well-known sporting writer explained it in this wise: "The ball must be a certain size and weight. If the manufacturers wound the yarn tighter, the ball would either have to weigh too much for the regulation circumference or it would be too small to meet the circumference if it were the proper weight. I believe that, if the ball was any livelier during the past few years, it was due to a different quality of woolen yarn."

Another sports writer holds to the other view. He said: "The whole matter of liveliness is due to tighter winding. The machines which wind the balls can be set to wind tight or loose. If the balls are wound tightly, they will travel high, wide and handsome; if wound loosely, they won't go far. The simplest illustration of this is found in a loosely wound playground ball."

In seeking the right answer we next turn to the official specifications of the baseball. We find that there it must be not less than five nor more than five and one-quarter ounces in weight and not less than nine nor more than nine and one-quarter inches in circumference. Nothing, however, is said about the size of the cork or cork-and-rubber center.

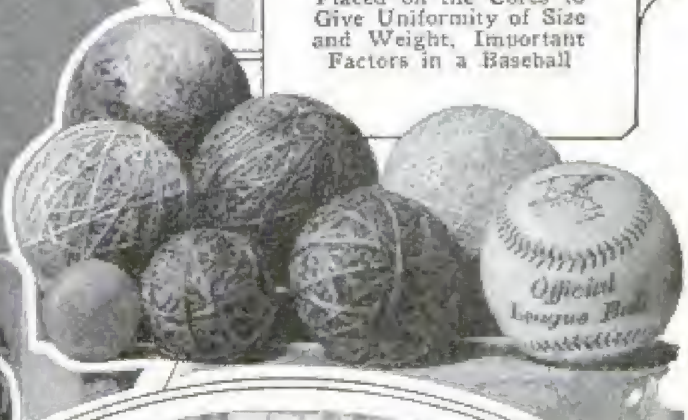
The ball used in both major leagues has a spherical cork center surrounded by a black semi-vulcanized rubber over which is vulcanized a second layer of pure red rubber. Upon this center is wound several layers of pure woolen yarn, and the whole incased by a horsehide cover. Up to this point the balls used by both the American and the National leagues are apparently identical, and since they are both made by the same manufacturer, we can



At the Automatic Winding Machines, Five Different Coverings Are Placed on the Cores to Give Uniformity of Size and Weight, Important Factors in a Baseball



Sewing On Covers by Hand, and, Above, Seven Different Stages in Development of Ball from Core to the Finished Sphere



While Most of the Manufacturing Is Done with Machines, Stamping Is Still Performed with Hand Stencils, as Shown at Left; in Upper Photograph, Alum-Tanned Horsehide Is Being Cut Out for Covers Intended Not to Shrink under Heavy Pounding



assume that there is no difference in them. The sewing is done with different-colored thread and the balls are stamped differently on the outside for each league.

The amount of rubber used and other things being identical, a ball with a cork center must be more tightly wound than one with a solid-rubber center. That is because cork is lighter than either the rubber or the yarn as ordinarily wound. Thus, to get the finished ball with the cork center to weigh as much as the finished ball with the same amount of rubber as a solid center, it is necessary to wind the yarn tighter so that a given weight will occupy less space. That naturally makes for a livelier ball. However, since the cork-center ball was introduced in 1909, this can hardly account for any greater liveliness since 1920 unless a greater proportion of cork is used now than formerly.

We can accept any of these theories if we care, but in the last analysis, about the only basis we have in believing that the ball is more lively now than formerly is the increasing number of home runs and the longer hits being made. And even that is far from sound evidence.

There are two factors which may well account for the longer hits that are now being made. One is an increasing tendency to take a freer swing at the ball and not rely on chopping at it for a well-placed hit, as was formerly more common. The other is the ban which was placed on the various freak deliveries shortly before the great epidemic of home runs.

About the best evidence that these two factors rather than an increasing liveliness of

the ball do account for the longer hits now made can be found by examining the records made in fungo batting. If we look into these we will find the longest hit recorded is a trifle over 419 feet. It was made on Sept. 30, 1911, by Ed Walsh, at a time way beyond that in which the ball had gained its late reputation for being more lively. It is a more accurate indication of liveliness because the distance a pitched ball may be hit is in no small part dependent upon the speed at which it is pitched. Probably Walsh swung his bat every bit as hard to knock the ball 419 feet as Babe Ruth did to knock it 590 feet. The difference of 171 feet was due to the speed at which the ball was pitched to Babe Ruth.

In reaching its present state of development since 1839 the baseball has gone through a number of stages. The old-timers who knew how the first baseballs were made are gone, but it is generally known that these first balls varied widely in construction and size. They were made by hand by almost anyone who cared to go into the business.

At one time the ball was made with a lead instead of with a rubber center and a man could be put out by hitting him with the ball. Until 25 years ago all baseballs were wound by hand. The yarn was wound, while wet, around a rubber core, each worker pounding the balls down to

make them smaller as they worked. When they were completely wound, they were larger than the specifications and heavier as



When Every Step in the Winding, Sewing and Covering Processes Is Done, the Balls Are Weighed before Shipping as a Final Check against "Freaks" That Might Spoil Games

well. They were then placed in an oven to bake, which not only dried them but shrunk them to the proper size. It was rather difficult to get the balls to a uniform size and weight by this method, but with the hand-winding, the wet process was the only way that they could be wound tightly enough to make a lively ball. With the invention of a winding machine, the wet process was done away with, and the balls wound with the dry yarn. The covers, except upon the playground balls, always have been and even now are sewed by hand.

There are not a few variations in the making of base-balls. Some have only pure woolen yarn between the core and the cover, while others have a coating of rubber cement underneath the cover to make them waterproof, or are wound with a fine cotton-finish yarn on the outside of the wool to make them ring when hit with the bat.

MUSIC STUDY AIDED BY MOVIES 510

Pupils studying at the Eastman school of music a department of the university of Rochester, for positions as motion-picture organists are given lessons in a miniature auditorium, while reels, depicting various subjects, are projected on a small screen. The object of this training is to familiarize the students with the character of different kinds of pictures so that they may select music that is the most suitable to the theme, learn how to improvise, supply the necessary accompaniments for soloists and become familiar with the intricate stops that produce the various tonal effects. The practice organ has all the "trick" attachments of a full-sized one.

Rochester, ny.

SPORTS PORTRAYED IN GLASS FOR CATHEDRAL WINDOW 1251

Both major and minor sports are featured in a design suggested by an eastern artist for the stained-glass window to be placed in the sports bay of the nave of the Cathedral of St. John the Divine now under construction in New York city. Recalling that athletics of today are associated with the old Olympic games which were religious in origin, the rose at the top of the window shows an angel placing the laurel upon a victor. This group follows the design on the medal struck off for the Olympic games held in Paris in 1924. The rose section of the window will be approximately seven by seven feet. The panels below will be six feet wide and eighteen feet high. Groups descriptive of four of the major sports, polo, golf, tennis and baseball, with smaller sections depicting a steeplechase, cycling, basketball, handball, swimming, gymnastics, yachting and billiards, occupy one panel. The other is devoted to four more major



Interpreting the Spirit of Athletics in Stained Glass;
Design for Proposed Window in Cathedral

sports, horse racing, rowing, track and field, and football, while skating, hockey, soccer, fencing, wrestling, pole vaulting, etc., are given positions beneath.

MEASURE WAVES WITH CAMERA 1684

Ordinary ocean waves are from six to twelve feet high while those in a gale may rise to a height of thirty-six feet. This has been determined accurately by means of a specially constructed camera. The instrument also measures the length of the waves. Some are as much as 900 feet from crest to crest.

*Det. Brits
A/20/26*

Time and Money-Saving Tools



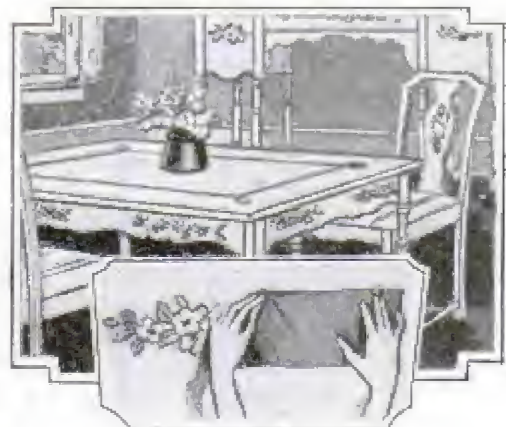
Spinning Washer Cleanses Clothes, Rinses and Dries Them for Line without Necessity of Handling; Illustration Shows Rinse Water About to Be Applied to Part Which Revolves



Combination Kitchen Table and Bathtub Affords a Farm Convenience; Inset Shows Tub in Use



Wall Compartment for the Electric Iron Is Fireproof and Affords a Rest on the Door



Colored Designs for Decorating Furniture Are Applied in Strips after a Coat of Varnish; Are Said to Be Durable and Require No Skill to Attach; Various Patterns and Special Designs for Corners Are Provided

for Woman's Workshop in Home



Where Space Is Limited, This Combination Range and Cabinet Saves Room and Steps; at Right Is a Mop Attachment Fitted to Ordinary Broom with String over Top



Automatic Electric Heater for the Hot-Water Tank; the Heater Is Built like a Vacuum-Bottle



Wheeled Platform on Which Rocker Can Be Placed to Make Invalid's Chair

ELECTRICIAN USES DOG SLED AND HAS ESKIMO HELPER

1406 Eskimos and dog sleds are not generally associated with the duties of an electrician but the caretaker of wiring in Mt. Rainier national park, Washington, has both of these aids when he makes his rounds during the winter months. Tools and supplies are carried on the sled, and the Eskimo "Dan" takes care of the dogs and assists the electrician.



them around until a scum appeared on the surface. The coating contained what seemed to be bits of metal but she could not believe that such material would float. However, she saved the scum and when her brother returned, it was analyzed.

It contained lead and zinc which had risen to the top on the bubbles of the soap, just as they now rise in the modern flotation process on tiny rafts of oil. The brother attempted to develop the idea in a small way and interest other mining men. Scientists took it.



Where Dog Power Aids Electricity: Sled and Outfit Used by Mt. Rainier Park Electrician

when he is occupied in making the necessary tests and repairs.

HOW WOMAN'S HATRED OF DIRT SAVED MILLIONS IN MINING

1424 Like many other discoveries and inventions, the so-called oil selective flotation process for treating low-grade ores was developed from a trivial incident. The story, told by a Colorado mining man, is vouched for by others. While in her brother's assay office in Denver, a young woman saw a pile of dirty ore sacks. Her natural instinct for cleanliness prompted her to scrub them. She doused the bags into a pail of sudsy water and swished

up, but the method was used merely as a secondary process until, some ten years ago, Australian metallurgists succeeded in floating silver, lead and zinc separately on different oils. After the war, more rapid progress was made with the method until it is now used in almost every part of the mining world, making paying projects out of workings regarded as unprofitable.

LISTENING TO PULSE AND HEART SHOWS WONDERS OF EAR

1335 As blood rushes through one of the large arteries to the brain, it passes less than one-sixteenth of an inch from the cochlea, one of the most sensitive parts of

Chicago Evening Post
2/26/26

H. C. Russell, M.D.
39 Charlotte St.
Winnipeg

POPULAR MECHANICS
man.

Jacobsen Mfg. Co.
Racine, Wis.
993

the ear. But the flow is inaudible to the person himself, yet it can be heard by another using a stethoscope. This apparent mystery is explained by Dr. A. G. Pohlman of the St. Louis university medical school in this way: The ear, at this part, is well insulated from all sounds except those which pass through the regular channel of hearing, and the pitch of the blood's sound is too low to make it audible. But when the stethoscope is applied over the artery, the vessel is sufficiently obstructed to raise the pitch and thus make it possible for another to hear the pulse. Experiments conducted by Dr. Frederick W. Kranz and associates, at Riverbank laboratories, have shown that the pulse is not audible under normal conditions even to a person in an absolutely silent, padded room, but can be heard almost anywhere if the hand is placed over the ear, disturbing conditions in somewhat the same way as results when the stethoscope is used. It is also possible for a person to hear the beating of his heart when he is in a perfectly quiet room. The sound is that of the organ itself, however, and not that of the pulse, in the opinion of the scientists.

PHONOGRAPH RECORDS PROVE DX RADIO RECEPTION

By recording the selections on phonograph records, an eastern radio fan kept proof of his success in bringing in foreign stations during the last international tests. When friends seemed doubtful that he had heard South America and Spain, he reproduced the program which his set had relayed to the disks, thus settling the matter beyond dispute.

Francis O. Hayk.



Proving That He Brought in Distant Stations by Radio; Selections Were "Canned" by Phonograph and Replayed at Will

Sheppan Pough

MOTOR-DRIVEN LAWN MOWER HAS DETACHABLE SULKY

One man can cut seven acres of grass in a day and enjoy a ride at the same time,



Motor Lawn Mower with Sulky Attached Saves Operator Work and Can Be Detached Quickly

using a motor-propelled mower with a detachable cart and seat, the manufacturers claim. The steering mechanism and engine controls are within convenient reach of the operator, pneumatic tires on the sulky insure comfort, and projections on the mower wheels afford traction without damaging the sod. The trailer can be unhooked in a few seconds, when slopes, restricted areas or other conditions demand. Additional features are that the mower

has a safety clutch which slips when sticks or stones are encountered, to prevent damage to the knife and other parts, the cutters are sharpened with the mower's own power through a special reverse gear and without removing the reel, and both differential and transmission run in oil in an inclosed dust-proof housing.

¶The Popular Mechanics' Bureau of Information offers its free service to all readers of our magazine. Names and addresses of manufacturers and dealers in articles described and any other details in our possession will be promptly furnished by addressing the Bureau.

Chicago agent. George B. Briggs, 1000 main st. Evanston.
5299 9 Clinton Ave. Chicago.



Child Patients
Enjoying the
Hospital's Radio

RADIO IN CHILDREN'S HOSPITAL CONNECTED TO EACH BED

By using a special six-way switching system and amplifier, a single seven-tube radio-receiving set serves several wards and many patients at one time in a large London hospital for children. More than 500 sets of headphones have been installed, one at each bed. They are connected by a plug-in system to the main distributing line. The radio has proved a great source of diversion to the patients. A London newspaper sponsored a campaign to equip every hospital in London with receiving sets and more than \$150,000 was raised for this purpose.

AUTOMATIC HOLDER FOR SASH ELIMINATES WEIGHTS

Windows are said to be kept from rattling, and weights, cords, pulleys, pockets and weather stripping are eliminated in a patented sash holder now on the market. It consists of an all-metal unit with adjustable springs that furnish sufficient compression against the side of the frame to keep the sash in any desired position. The holder can be installed without the use of screws or nails. Rollers of steel construction ease lowering and raising, and the windows can be made more secure against dust and cold air.

SKILL OF WOMEN AUTO DRIVERS UPHELD BY RECORDS

Intelligence tests have shown that women are just as capable automobile drivers as men and now accident records from various parts of the country further substantiate their ability, although the common tendency is to regard them as poor operators. From figures for 1925, Massachusetts authorities found that only two and one-half per cent of the women drivers were involved in fatal accidents, which totaled 716 for the state. These accidents concerned 814 drivers, only forty-two of whom were women. About fourteen or fifteen per cent of all the drivers in the state are women, according to the registrar of motor vehicles, but there was not a corresponding proportion involved in accidents, only about five and three-tenths per cent of all the drivers participating in fatal accidents being women. In Connecticut, there were eight times as many men as women licensed to operate motor vehicles, and the men were responsible for fifteen times as many accidents as those ascribed to women drivers. From Los Angeles it is reported that the ratio of male and female auto drivers involved in accidents is ninety-six men to four women.

TUBE GAUGE ON AUTO GAS TANK UTILIZES RESERVE SUPPLY

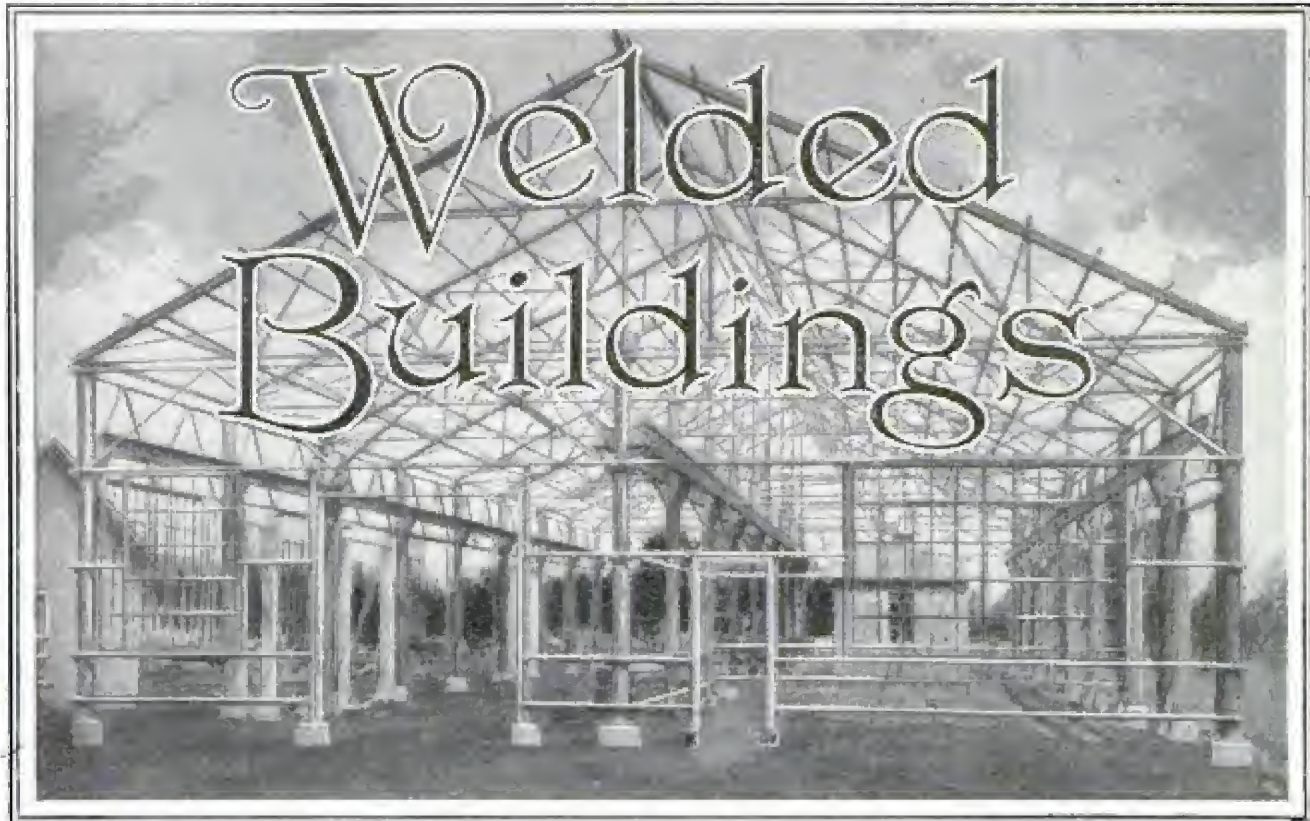
Warning is given the driver when the gasoline supply is low by a tube gauge that insures a reserve and affords a way to use it. The feed line of the car is adjusted so that the outlet tube extends into the tank to about one and one-half inches from the bottom. When the supply is exhausted to this point, the rest is made available for use simply by pushing down the handle of the special tube gauge which is connected to the regular feed line.



1444
York World 2/28/26
New York 1/5478
Walnut Pasadena, Calif
Elton
Edw. W. Murray
and

Ans. H. A. Busby.

1396
Waulley Sash Holder Co.
108 Home-manufactured
Old



Framework of an Oil-Field Storehouse, Built Entirely from Standard Pipe Sizes Used in the Oil Business and Welded into One Unit with Oxyacetylene Torches

Linde Air Products
30 E. 42nd, New York City

New Process Forecasts Doom of One of City's Most Annoying Noises as Builders Turn to Welded Joints

THE glow of molten steel and soft hiss of the welding torch have begun to replace the staccato din of the compressed-air riveting hammer in the construction of the framework for tall buildings. If the success forecast for the welding process materializes, another of the city's most annoying noises will have been banished.

Tried out in an experimental way for several years, both electric-arc and acetylene welding for structural steel has come into more or less general use in the industries most familiar with the process, but for general work, it is still in the infant stage. The big electrical companies themselves have erected many electrically welded buildings in their plants, and out in the oil fields, where acetylene-welded pipe lines are common, the same process has been used to erect steel-frame buildings out of stock sizes of iron pipe. The growth of the welding process there was the natural result of shortage of materials and the long freight haul from the centers where structural steel is formed and shaped into building parts. There is always plenty of iron pipe on hand in the oil fields and refineries, so the resourceful mechanics turned to it for building purposes. With a few lengths of standard-size I-beams for crane runways, entire

warehouses have been built without using any other material than oxyacetylene-welded pipe.

It is in the cities, on the other hand, where plenty of electric power is available, that arc welding is coming into more general use. Locomotive builders and other manufacturers used the process to some extent for several years before the war, but it was not until the United States took over the "Leviathan" and discovered that the German crew had attempted to wreck its machinery, that the electric welder came into prominence. What looked like a hopeless repair job was taken over and completed in record time by electric welding. Shipyards were quick to see the advantage of the process and began welding ship plates instead of riveting them.

From that to welded buildings was but a step, soon made. Factories at Cleveland and Schenectady, manufacturing welding equipment, tried out the process on their own plants, and others followed the example. A twelve-story addition to a Detroit store was joined by welding to the old building alongside. A Brooklyn, New York, store was built with all-welded framework; a railroad tried out the process in Illinois; an automobile salesroom



Welding the Framework of a Big Building; the Original Plan Called for Riveting, and Much of the Ironwork Had Been Drilled for Rivets, But Was Used Just the Same

and garage adopted it in Canton; a brace of stores in near-by cities followed suit and, by that time, the process was established and architects had discovered welding simplified some of their construction problems.

Tests in the plant of the Morgan Engineering works, at Alliance, Ohio, which built a welded building after first using electric arcs in manufacturing processes for several years, show that welded joints can be made stronger than riveted. Two by three-inch steel bars, riveted together, sheared a three-fourths-inch rivet in half and pulled apart in the testing machine when subjected to a strain of between 23,900 and 24,000 pounds. A double lap-welded bar of the same size broke at 42,000 pounds in the body of the bar, the weld remaining intact. In all the tests, covering in some cases full-size structural steel beams, the riveted pieces broke through the rivet holes, while the welded bars usually broke at some other point.

In one test, under a 700-ton blow from a steam hammer, the welded joint held,

though the beams were badly bent. The arc welder wears a special outfit and works in a canvas booth closed on three sides to protect the arc from air currents. A fiber hood fits over the welder's head, with special lenses to protect his eyes from the intense light. Closely woven clothing, a leather apron and bellows-tongued shoes guard against particles of molten metal reaching the skin, and heavy leather gauntlets cover his hands.

In his right hand he grasps the handle holding the carbon electrode of the arc welder, and in his left holds a steel filler rod, to be melted down to furnish extra material as needed. The building-frame itself forms the other side of the electrical circuit, and the welding arc is made by touching the carbon to the steel frame and then withdrawing it. The electrical current, started flowing at the moment the carbon and steel touch, continues to jump the opening gap, generating intense heat. The parent metal of the beams begins to soften under the terrific heat and as it becomes molten the welder thrusts the

end of the filler rod into the arc, melts off a small piece, and then, with a rotary motion of the electrode, "puddles" the fresh steel into the parent metal until the section of joint is built up to the desired thickness. The rotary puddling also serves to release and float off particles of carbon and slag, which can be knocked off from the edges of the joint, while solid, clear metal is left behind.

The welding process is many years old, having been patented by Bernados and Olszewski in 1885, the only vital change made since their day being the addition of the filler rod to provide the extra metal needed to fill up the joint and insure adequate thickness.

Much of the welding can be done in the shop before the steel is erected. On one Ohio factory building, 4,171 welds, varying in length from two and a half to fourteen inches, were made in the factory, and only 780 remained to do during the erection. One man did the welding on the job in 120 hours, as compared to a riveting force of five men required for the same amount of work.

Welding is useful in many places where riveting cannot be done. With the invention of underwater torches it is now possible to make repairs on a ship at sea, or cut into wrecks to be salvaged, since the torch can either join or separate materials or sever those already joined. The underwater torch uses a strong current of air to blow the water out



Electric Welder, Protected by Helmet and Goggles, at Work; a Welded Addition to a Big Office Building, and, at the Bottom, One of the Portable Electric-Welding Outfits

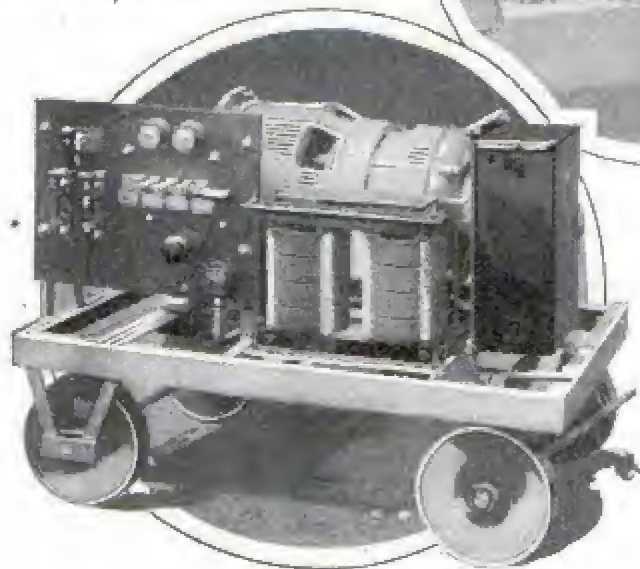


of a cup at the torch end, forming a chamber for the flame.

The fate of the unfortunate crew of a submarine which was sunk off Long Island last fall was first definitely determined by a welding torch. A diver went down and burned a small hole through the steel plates. Had the compartment below been intact, with water-tight doors closed, escaping air would have advertised the fact, and the diver was ready with a plug to close the hole. But when no air bubbles escaped,

it was evident that the compartment was flooded, and all of the crew dead.

A crew of expert divers was trained with the welding torches during the winter to be ready to cut up the submarine in sections this spring, should the salvage equipment fail to raise it intact. The government is anxious to recover the submarine, not only to rescue the bodies of the crew, but to study the effect of the accident, and find out, if possible, why the water-tight compartment doors apparently failed to close.





Dirigibles Anchored to This Mast Are Drawn to the Ground, Simplifying Loading and Unloading

MOORING MAST FOR DIRIGIBLES LANDS CRAFT ON GROUND

Cargo, passengers and the dirigible itself are pulled to the bottom of a mooring mast erected at a Michigan flying field. The bow or nose of the ship is securely fastened in a sliding guide and when the craft has reached the ground, the control car and rear are made fast to small trucks. The ship can swing horizontally while being taken down or elevated as the guide rotates around the outside of the tower. The mast is 210 feet high, stanchly anchored on three legs and has a cylinder at the top to serve as landing stage for the elevator and a shelter. Water, gasoline and supplies of gas for replenishing the

bags are furnished from the top of the tower. A powerful system of illumination is installed and the mast is painted in alternate bands of yellow, black and white to increase visibility even when the weather is foggy. It is designed to withstand a wind of 100 miles an hour.

PLAN TO CIRCLE THE WORLD IN TWENTY-FIVE DAYS

Seeking to lower the mark made in 1913 by John Henry Mears, Edward S. Evans, a Detroit sportsman, and Lieut. Linton Wells, a war-time naval aviator, are planning to circle the world in twenty-five days. They expect to start from New York city in June, fly to Victoria, B. C., in thirty hours and catch the fastest liner for Japan. Intending to reach there in eight days, they anticipate that a Japanese destroyer will carry them to Vladivostok within eighteen hours, where they can take the trans-Siberian railroad for a nine-day trip to Moscow. A flight from there to Berlin, Amsterdam and Cherbourg would enable them to catch the swift "Mauretania" for the trip back to New York. Mears made his journey in thirty-five days, twenty-one hours and thirty-five minutes. For several years before his feat, the record was held by an American woman, Nellie Bly, who left New York Nov. 14, 1889, and returned seventy-two days, six hours and eleven minutes later.

PEN THAT WRITES WITH WATER CARRIES INK IN STICK

Holding ink in stick form, a pen now on the market need only be dipped in water for writing. The stick is inserted under the point and comes in contact with the liquid through a small opening. Immersion is required for only about one second. If water is not available, milk, lemonade or other liquids that leave no deep stain may be used. Extra sticks are carried in the handle of the pen.



Camel's hair is used by the Bedouins in the manufacture of yarn.

Word Landing Field, Dearborn Mich

1392

*Patented by the U.S. Patent Office
Corps, Detroit, Mich
1/27/13
Science Monitor
Christmas
1914
Lentokent, 178 Water St
Worcester, Mass.*



Ponca.

Combination Reservoir and Tennis Court under Construction; the Games Will Be Played on Flat Top Which Is to Be Coated with Mortar Color to Decrease Sun's Glare

RESERVOIR AND TENNIS COURT COMBINED IN ONE

1316

Besides other unusual features incorporated in a 2,000,000-gallon reservoir constructed in an Oklahoma city, it has a tennis court on the top. The basin has a diameter of 160 feet and an inside depth of fifteen feet. It was built entirely of reinforced concrete and steel, and the flat top, previous to its finishing, was sprinkled with mortar color to eliminate glare from the sun. The cost was nearly \$40,000.

1435

GOOSEFISH CATCH FOOD WITH SLENDER SPINES

Among the specimens to be shown at the Shedd aquarium, planned for Grant Park, Chicago, will be one of the most curious fishes known, the goosfish or fishing frog, as it is sometimes called. It uses a spinelike rod tipped with a small flap of skin for "bait" to lure small creatures of the sea close to its mouth, which is huge and equipped with large, sharp teeth. This fish sometimes reaches a length of three to four feet and weighs as much as forty-five or fifty-five pounds. It occasionally gorges its own weight in smaller

fish, crabs and lobsters. There are three spines in all, one close to the tip of the snout and the others nearer the eyes, one in front and one to the rear. The first and second spines are movable. When feeding, the creature lies perfectly still with its "fishing pole" extended and the "bait" swaying slightly back and forth over its mouth. When the prey comes up to examine this object, the goosfish opens its mouth and snaps in the victim. The species is found off the coasts of Europe and North America from Newfoundland to North Carolina, and is said to be one of the ugliest fish in existence.

DOG LEASH ON BICYCLE KEEPS PETS SAFE

1404



Dog owners can exercise their pets and ride a bicycle at the same time by the use of a patented safety leash fastened to the frame. It has a spring swivel attached to the dog's collar and is so adjusted that a sudden swerve of the animal will not upset the rider. Dogs are practically secure from injury by automobiles and get as much benefit from the exercise as from free running since the rider can easily attain considerable speed.

Walter A. Chute

Dog Gets Brisk Airing in Safety from Autos

Edw. M. Isrooth, Jr.



Japanese Horsemen in Action with Long Banners; the Object of the Game Is to Ride around the Ring a Specified Number of Times without Letting the Flag Touch the Ground

STUNTS WITH FLAMING BANNER TEST HORSEMAN'S SKILL

Horsemanship is not customarily associated with the Japanese, but some of their trick riders pride themselves on their skill in the saddle. One of their feats consists in riding around a small circle while carrying a long flaming banner from a short pole. The object of the test is to go around the ring a specified number of times without allowing the banner to touch the ground.

WEATHER STATION IN ARCTIC TO GIVE STORM WARNINGS

Somewhere within the frozen confines of the Arctic circle, a severe storm is brewing. Its blasts sweep down on the northern hemisphere. But days before it strikes, a wireless warning has flashed from a lonely weather station up among the glaciers and loss of life averted and property damage reduced. This vision promises to become a reality as a result of the expedition planned for this summer by the university of Michigan to set up weather observatories within the vast refrigerator of Greenland. It is here, according to Prof. William Herbert Hobbs, that some of the worst storms that lash the

waves and crush the ships of the Atlantic, are born. It sometimes takes the winds three or four days to travel from the margin of Greenland to Europe, the professor declares, so that there would be ample time to send warnings by radio. Mapping of the region from airplanes, study of fish life, movements of ice mountains and measurements of the ice crusts are also objectives of the trip. To Peter Freuchen, former Danish governor of the Thule Eskimo settlement in northern Greenland and second in command on both of Knud Rasmussen's long expeditions, falls one of the difficult tasks of the adventure. He has volunteered to remain a year in a hut about a hundred miles inland from the coast to record weather conditions.

GUTENBERG BIBLE IS SOLD FOR FORTUNE

One of the Bibles printed by Gutenberg, credited with the invention of printing from movable type, sold for \$106,000 at an auction in New York recently. It is in excellent condition. According to some experts, although the mechanical processes have been greatly improved in the printing art, the quality of workmanship has not been surpassed by later artisans.



Purchaser with Bible Printed by Gutenberg; One of the First Books Made from Movable Type

Bought by Mr. A. S. W.
Rosenbach & Phila and New York

Chicago Evening Post
2/25/26

1320 Walnut St. Madison, New York
Rosenbach & 273

A Convenient All-Wave Switch

By HUGH G. BERSIE

TO build a single receiver which will cover all required wave bands equally well, necessitates the adoption of some type of tapped coils. An extremely large variable condenser, such as the .001-mfd. type, does not answer because the stations are then crowded close together on the dial, making them hard to separate, even with vernier attachments.

From an electrical point of view, the more satisfactory method of covering these wavelengths is by means of a small variable condenser, such as the .00025 or .00035-mfd. type, these condensers being used in conjunction with tapped coils. This method is illustrated in Fig. 3. When the switch point is set on the tap marked "high," the entire coil is in the circuit, and the higher wavelengths from 600 down to 350 meters are covered as they should be. But when the switch lever is

moved to the tap marked "low," only a part of the coil is used and the wave range is reduced to the band from 370 to 150 meters. The small condenser thus takes care of both ranges efficiently, eliminating crowding on the dial and increasing the selectivity of the set.

In the neutrodyne, and other types of tuned r.f. circuits, where it would be necessary to have three sets of switches—one for each coil—the method becomes a little more complicated. In some commercial sets these switches are connected with

an insulated rod; but such a combination would be difficult for the home constructor. The

same results can be obtained easily with the switch illustrated on the panel directly above the condenser shaft. Three contact points are used, the center one being blank; the switch is mounted on the panel as shown in the section diagram Fig. 4 and in Fig. 2; the switch lever is bent up in the position shown. This switch lever can be made from a bit of spring brass or a phosphor-bronze strip.

The method of shifting this switch lever from one

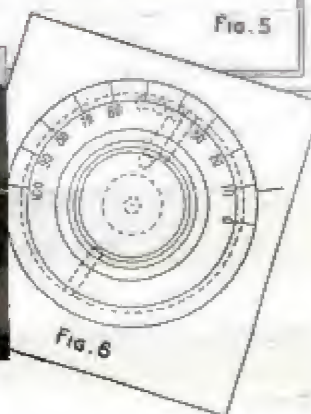
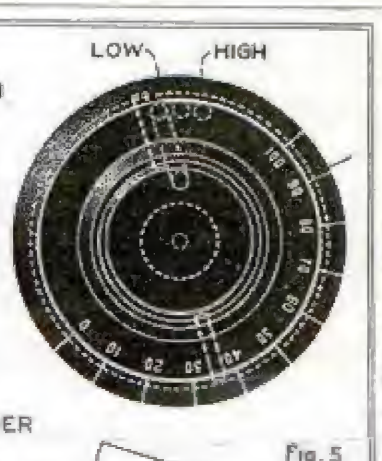
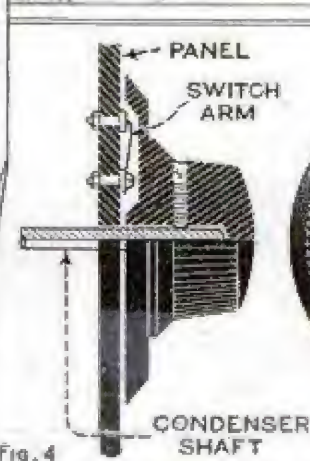
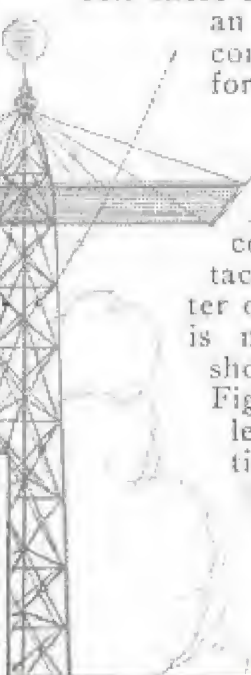
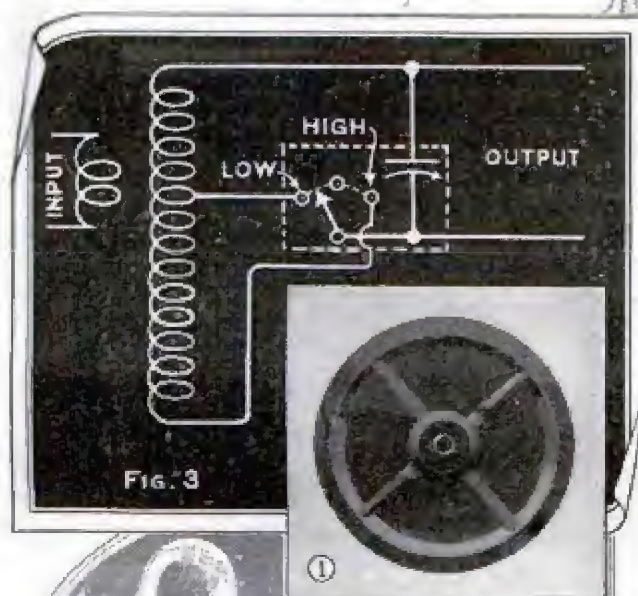


Fig. 3. Diagram of Connections; Fig. 1. Photo of Underside of Dial; Figs. 4 and 5. Sectional Views of Dial and Switch, and Figs. 2 and 6, the Position of the Bars

contact to the other is unusual. The underside of the ordinary dial is shown in Fig. 1; it will be noted that the dial is molded with a circular depression that is crossed by the four ridges; two of these have been cut or filed away. The two remaining bars serve to operate the switch as shown in Figs. 5 and 6. Note, in Fig. 5, that the dial is shown just moving by the 90-mark and simultaneously one of the bars is shifting the switch from the low to the high position. Moving the dial back over the portion from 100 to 10 will bring in the high wavelengths. If the operator wishes to go to the lower wave band he will simply move the dial on from 10 to 0, as indicated in Fig. 6. This shifts the lever over from the high to the low position. It is easy to tell by the feel of

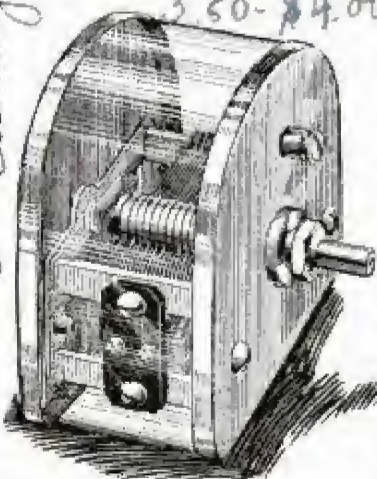
the dial whether the switch is in the high or low position.

The coil should be tapped for the low switch point approximately $\frac{1}{10}$ from the grid end; thus, when the switch is in the low position but $\frac{1}{10}$ of the coil will be used. For example, if the entire coil is 60 turns, it should be tapped at the 24th turn from the grid end.

If the dial used does not happen to have bars or ridges, as shown in the photo, small flat-head brass machine screws can be used; these should pass through the dial from the front and project back far enough to operate the switch lever. The middle or blank contact point can be used if the operator desires to have a third point for receiving messages sent on extremely low wavelengths.

Condenser Inclosed in Dust-Proof Case

A new straight-line frequency condenser inclosed in a dust-proof case is now

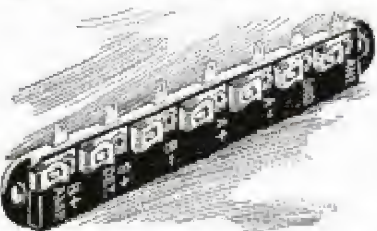


which is claimed to be immune to capacity changes and shorts caused by dust. The case has a metal front and back, which are grounded, shielding the condenser, and a transparent material com-

pletes the case as shown in the illustration. The unit is of the single-hole mounting type, and is made in two capacities, .00035 and .0005 mfd.

Spring-Clip Terminal Strip for Quick Connections

A terminal strip equipped with spring clips for the various battery, aerial and ground connections is a practical novelty on the market. The soldering lugs extending from



the strip are for the connections to the circuit in the set; to connect the battery and other leads the clips are pressed down with the finger and the end of the wire slipped into place.

This is handier than searching for a hole in a binding post or making a loop of the connecting wire.

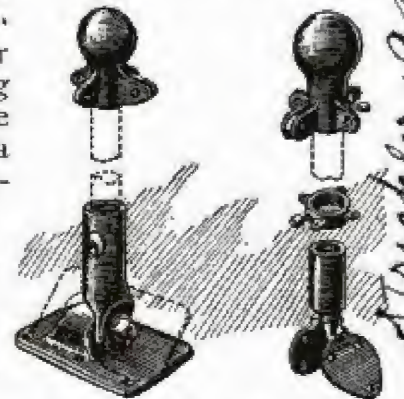
Radio Reception Improved by Double Loud-Speaker Unit

Radio reception is materially improved by the use of a device whereby double reproduction of each sound is obtained. The principle of the device is as old as musical instruments themselves; every sound is reproduced with a double loud-speaking unit, and to give the desired tone quality, the sound from one unit is delayed a fraction of a second, also giving increased volume.

Adjustable Fittings Simplify Aerial Installation

Metal fittings that simplify the installation of roof aerials, have been placed on the market.

They are designed for mounting either on the side or the ridge of a roof and are adjustable to any pitch. That illustrated at the left, terminates in a flat plate, which can be set to various angles by means of a screwbolt, while the other has two adjustable wings at the bottom for ridgepole mounting. The socket is made to take $\frac{1}{2}$ -in. iron pipe. A slipping provided with a setscrew carries four



John J. Mucher
100 E. Lake St.

Drayton & N. Jefferson
Chicago

Walbert Mfg. Co.
927 W. Regitwood
Chicago

703-A

350-84.00

791-A

715-A

1012 Eddy St.
Providence
R.I. 003

eyelets for fastening the guy wires and the ball top is also provided with flanges for attaching more guy wires, if required.

A Soldering Kink

No matter what the type of soldering flux used, it is a good idea to remove any excess from the joint after it has been completed. Acid fluxes, of course, should never be used on wiring work, but the amateur usually buys his flux from the nearest hardware or radio store, and he may get hold of some that contains a trace of acid, even when it is supposed to be innocuous to wiring. Pipe cleaners, widely used by radio fans for cleaning dust from between condenser plates, may also be pressed into service for removing the excess flux. Double one and dip the doubled end into denatured alcohol, then scrub the joint until all trace of the flux has been removed. An old toothbrush is also an excellent tool for the job.

Wiring Harness for Radio Kits

One of the recent developments in the merchandising of radio kits is the use of a special harness or cable similar to that shown in the illustration. Connections are provided for the various transformers and A and B-battery circuits, thus eliminating soldering and binding posts, as the leads are continued in cable form. A color code is furnished with the kit in order to prevent errors in wiring.

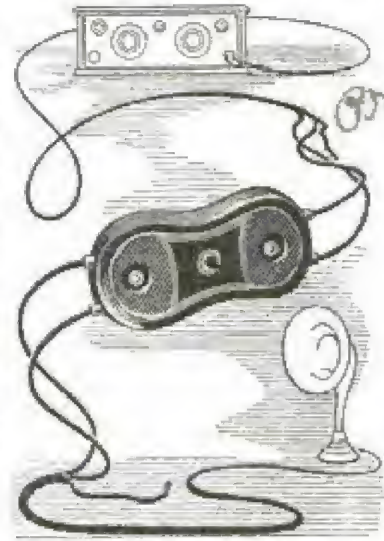
Much Smaller Loops Promised for Future Radio Sets

The loop of the future may be no larger than a man's hand, according to a statement made by a prominent designer of loop sets, so that it can be easily concealed in the set itself. Such a loop will greatly simplify construction and design, and give freer rein to artists who want to create cabinets in unconventional designs. No loss of efficiency is expected with the small loops.

Connecting Plug for Loud-Speaker

743-2. Extensions \$1.75

A connecting plug for making quick extensions of the horn cord has lately made its appearance on the market. The horn-cord terminals are plugged in on one side of the unit and the extension-cord terminals in the other side. The device is provided with an automatic release, eliminating the necessity for set-screws. A 20-ft. extension cord is furnished with the double plug, permitting the removal of the horn to an adjoining room if desired.



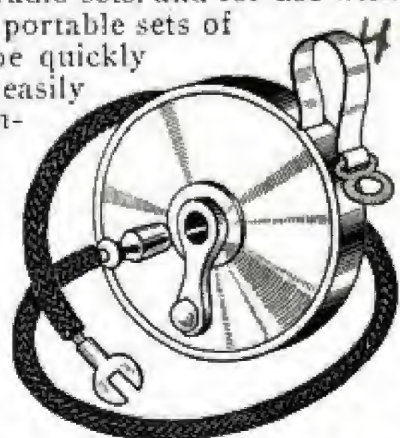
Shielded Variable Condensers

Improve Reception 724-

Shielded variable condensers are now available, and their use will improve any set. The condenser is entirely inclosed in a metal container which keeps dust and foreign substances from between the plates. It protects the plates from injury, and at the same time shields the condenser from body capacity and from "magnetic spraying" from other near-by instruments.

Pocket Aerial in Form of Reel

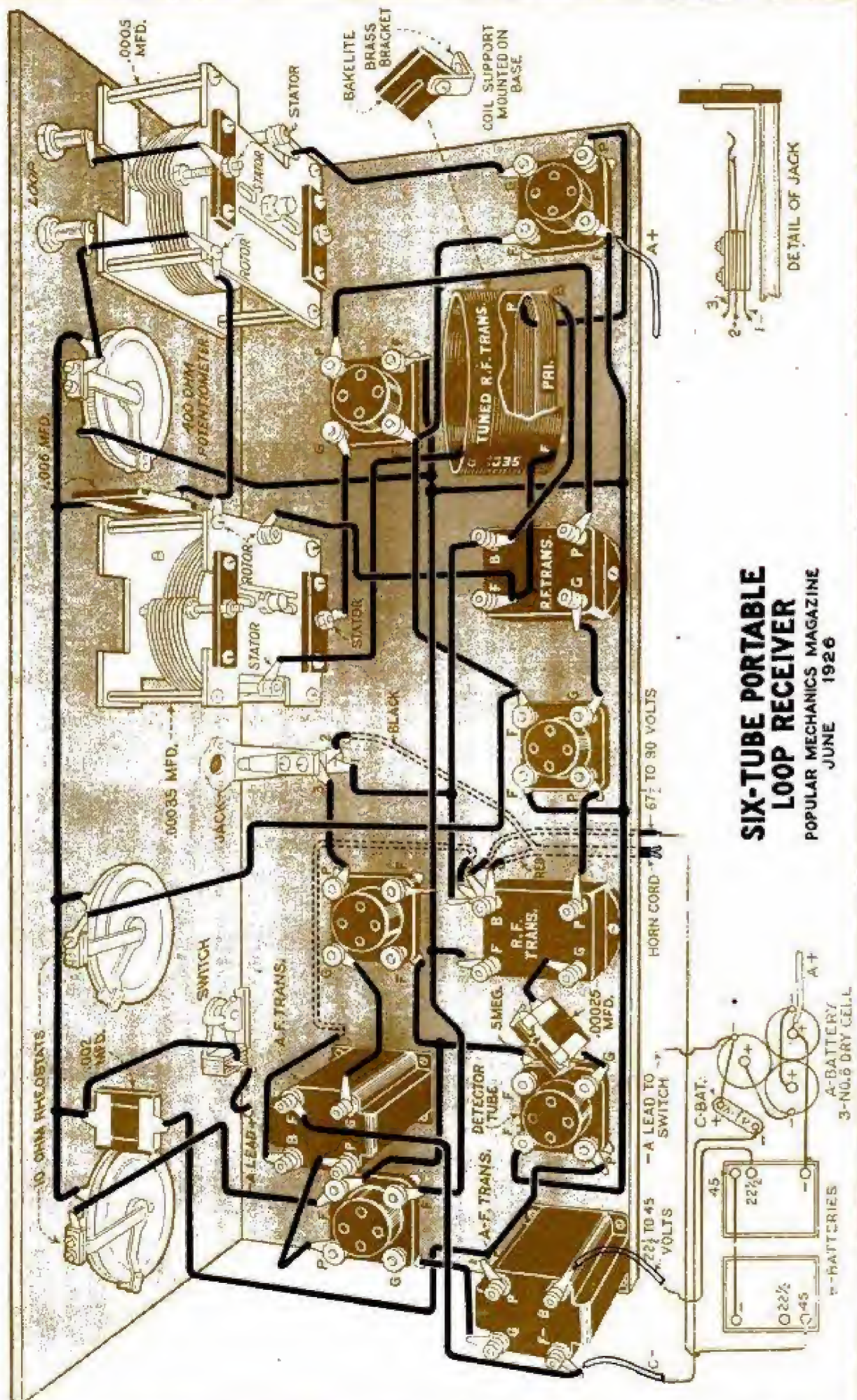
A pocket aerial in the form of a reel for demonstrating radio sets, and for use with permanent and portable sets of all kinds, can be quickly installed and easily removed without the usual tangling of wire. The aerial consists of a 100-ft. length of 1/4-in. hard-drawn flat-copper wire in a metal case provided with a take-up reel. The outer end of the aerial has a suitable insulator, and the center of the case serves as a jack for fastening the connecting wire to the receiving set.



Belden Wg. Co.
2300 S. Western Ave.
Chicago

Premier
Radio Corp
Chicago
All. Armington
4201 Belmont Ave

Hawkeye Radio Co.

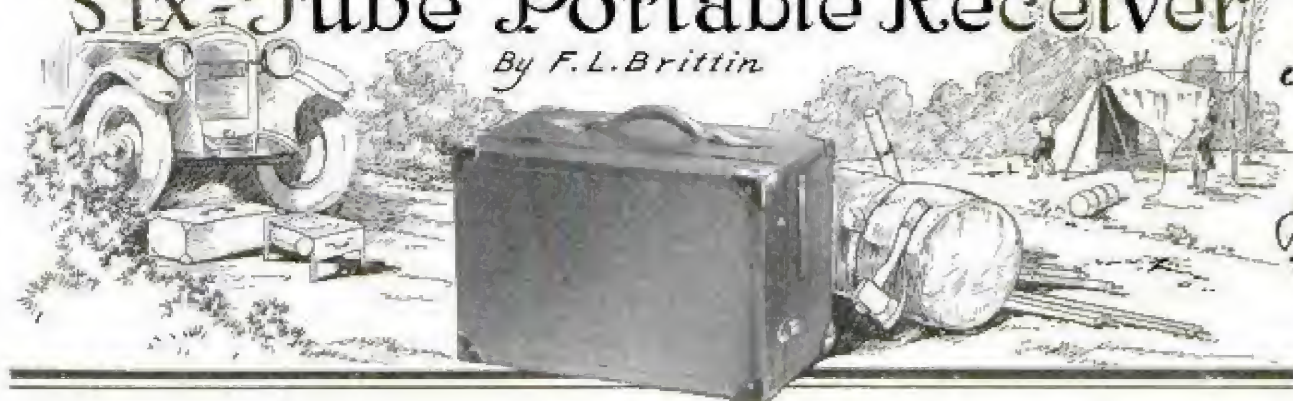


SIX-TUBE PORTABLE LOOP RECEIVER

POPULAR MECHANICS MAGAZINE
JUNE 1926

Six-Tube Portable Receiver

By F. L. Brittin



*in whole
or part
for
making*

AN exceptionally good six-tube loop receiver, really portable and dependable, is to be described in this article. Its weight, completely equipped with tubes and batteries, is only 32 lb., making it a practical set for the auto tourist and camper, although its appearance is attractive enough not to exclude it from the home. The complete cost to build it is about \$105.40, including all accessories. Three No. 6 dry cells are used for the A-battery, and as these can be bought at almost any crossroad store or garage, renewal is easy. The B-batteries are sufficiently large to last for several months.

The parts for the instrument itself are all of standard make and can be obtained from any dealer in radio supplies; the case is made of light wood covered with a dull-black grained imitation leather. This case can be obtained as a complete unit, making it easy for the builder to complete the set quickly. The loop is built into the lid of the case in the form of a swinging unit; the horn and batteries, as shown in the rear view of the finished instrument, are all contained in the case. The overall dimensions are: height, $11\frac{3}{4}$ in.; width $10\frac{1}{4}$ in. and length $17\frac{1}{4}$ in. The instruments are mounted as a separate unit, which rests on top of the battery compartment. The results obtained under difficult conditions show the receiver to be very selec-

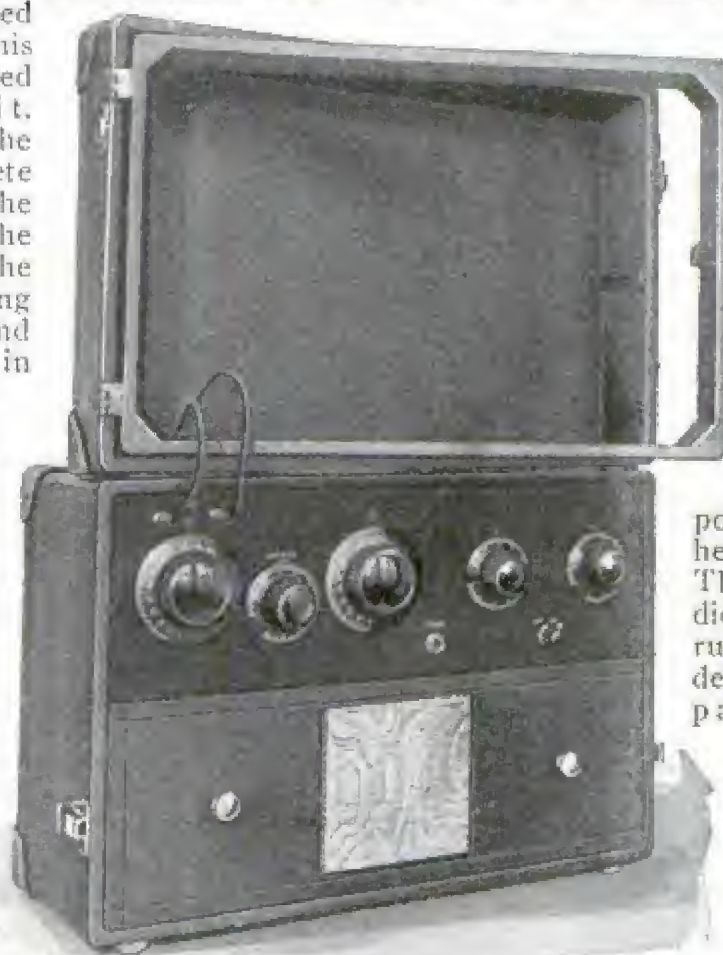
tive, and the range included a log of some 80 stations extending from the east to the west coast, all on the horn. The tone is very good.

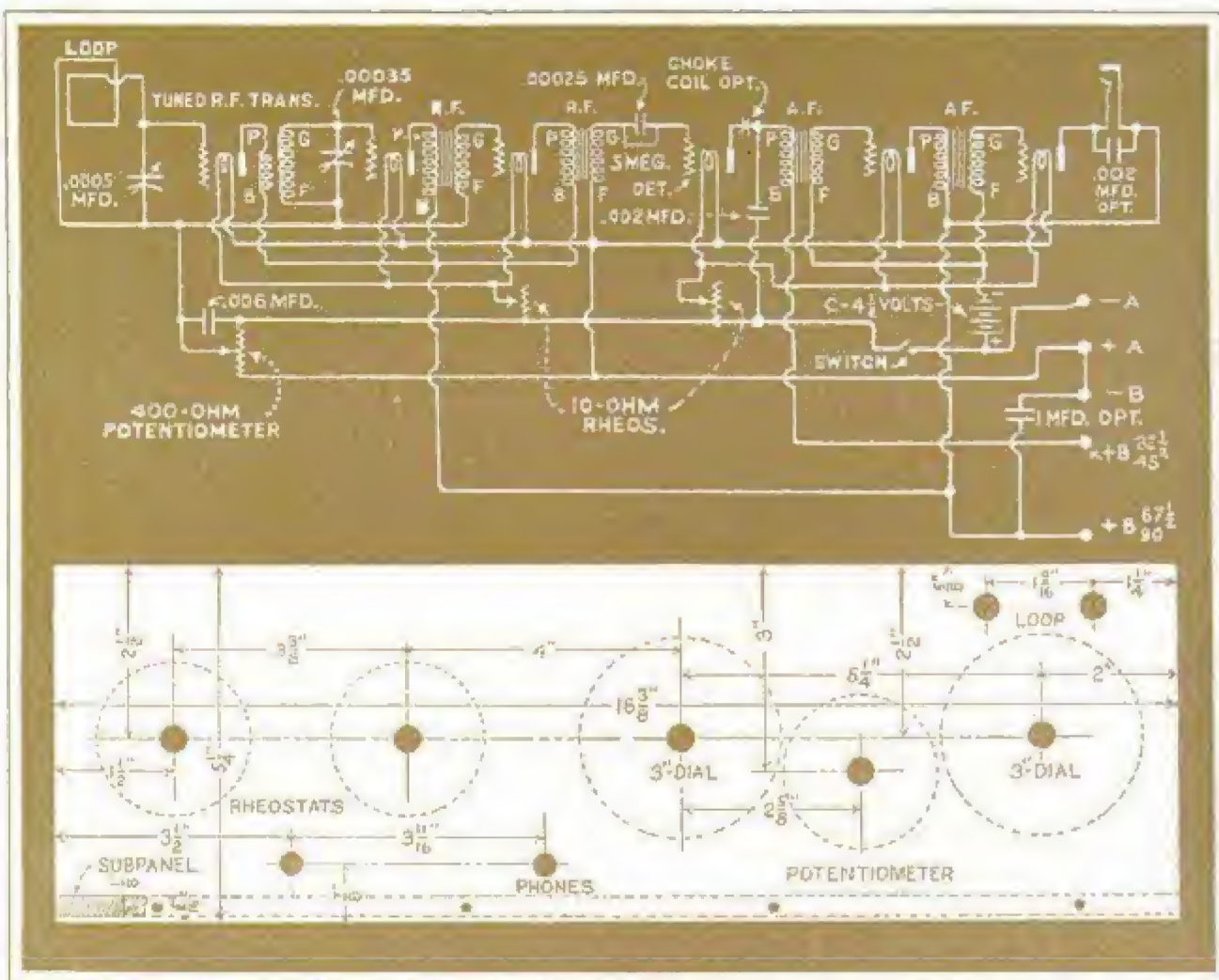
In building this set, follow the specifications carefully and use good materials, as poor parts and poor results are closely related.

The front panel should be of some good insulating material especially adapted for radio use, and carefully laid out for the required holes in accordance with the template. Drill the panel from front to back, and mount the instruments. The subpanel used in the model is of light wood, and the instruments are mounted with short wood screws. Note the little insulated bracket for mounting the r.f. coil. After the instruments are all in

place, the front panel is fastened to the baseboard with four round-head, nickel-plated wood screws. The set is now ready to wire; the large wiring diagram shows each instrument in place, and the wiring from

point to point is in heavy black lines. The dotted lines indicate the wires running down underneath the subpanel and up to their respective terminals. A schematic diagram is given for those who prefer the conventional wiring plan. The wire





Above, Schematic Diagram Showing Suggestions at the Points Marked "Opt." for Those Who Wish to Experiment Further with the Circuit; Below, Front-Panel Drilling Template

used for the circuit is round tinned-copper busbar, and a small amount of flexible rubber-covered fixture wire where convenient, especially for the flexible leads that are brought down to the battery compartment, as shown in the upper rear-view photo. Room for these few leads is provided by the $\frac{1}{8}$ -in. space under the subpanel; this space is indicated at the lower

edge of the panel-template diagram. After the wiring is completed, place the instrument on the battery compartment, and run the leads down to the A and B-batteries, as shown in the upper photo. It will be necessary to drill holes in the top of the battery and horn compartments for the connecting leads. The horn cord is run up through a hole cut in the subpanel,

MATERIAL LIST

- | | |
|--|---|
| 1 front panel, 3-16 by 5 $\frac{1}{4}$ by 16 $\frac{3}{4}$ in. (insulated panel material). | 2 cord-tip plugs. |
| 1 baseboard, 5-16 by 6 $\frac{1}{2}$ by 16 $\frac{3}{4}$ in. | 2 cord-tip jacks. |
| 2 a.f. transformers, 3 $\frac{1}{2}$ to 1 ratio. | 1 gridleak, 5-meg. (also try other values from 2 to 5 meg.). |
| 2 Duratran r.f. transformers, 225 to 550 meters. | 1 C-battery, 4 $\frac{1}{2}$ volts, small type, (Burgess 5360 or similar type). |
| 1 variable condenser, .0005 mfd., with small vernier dial. | 2 B-battery units, 45 volts each, (Burgess 5308 or similar type). |
| 1 variable condenser, .00035 mfd., with small vernier dial. | 3 No. 6 dry cells. |
| [National DX-condensers used in model, any similar type can be used.] | 1 loud-speaker unit. |
| 2 10-ohm rheostats. | 6 UX-199 or CX-299 tubes. |
| 1 400-ohm potentiometer. | 1 fiber or bakelite block, 3-16 by 1 by 1 $\frac{1}{2}$ in. |
| 1 filament switch. | 1 strip brass for bracket, 1-16 by $\frac{1}{8}$ by 1 $\frac{1}{4}$ in. |
| 1 fixed condenser, .00025 mfd., with gridleak clips. | 5 2-ft. lengths, round tinned-copper busbar wire. |
| 1 fixed condenser, .002 mfd. | 10-ft. flexible rubber-covered fixture wire. |
| 1 fixed condenser, .006 mfd. | 5 dozen soldering lugs (long, round-hole type). |
| 6 X-tube type spring-suspended sockets (Benjamin or similar type). | 2 dozen $\frac{1}{2}$ -in. brass wood screws. |
| 1 two-circuit jack, Carter No. 102-A or Yaxley No. 2-A type. | 4 round-head nickelplated wood screws, 1 in. long. |
| | 1 Essential case kit, containing 1 Piper R.F. coil, built-in horn and loop. |

C. E. Callender Co
911 Peoples Plaza Bldg

and the terminal on the black horn cord is then soldered to the No. 2 point on the jack, while the red tracer cord is soldered to a lug on the B-post of the second r.f. transformer. Four lugs are mounted on this post, as shown in the large wiring diagram. After the batteries have been connected, place a tube successively in each socket and turn up the rheostat controlling each group of tubes to test the filament circuit; if everything is as it should be, place all of the tubes in the sockets. The completed instrument can now be placed in the case, the loop plugs pushed into the small jacks at the front of the panel, and the receiver is then ready for operation.

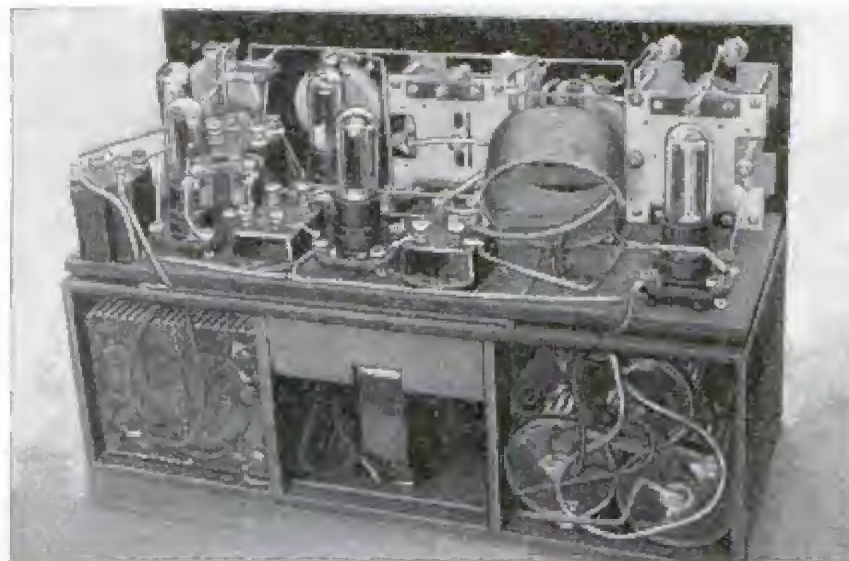
Turn on the filament switch and advance the rheostats, then rotate the dials in step until a station is picked up. Volume control can be obtained with the potentiometer. After some practice it will be noticed that distant stations can often be brought in by adjusting the potentiometer, and local stations on various wavelengths will require different settings

A large blueprint of the wiring diagram and full-size template of the front panel can be obtained from the Radio department of Popular Mechanics Magazine, 200 E. Ontario st., Chicago, for 15 cents to cover cost and mailing. Specify blueprint No. 110.

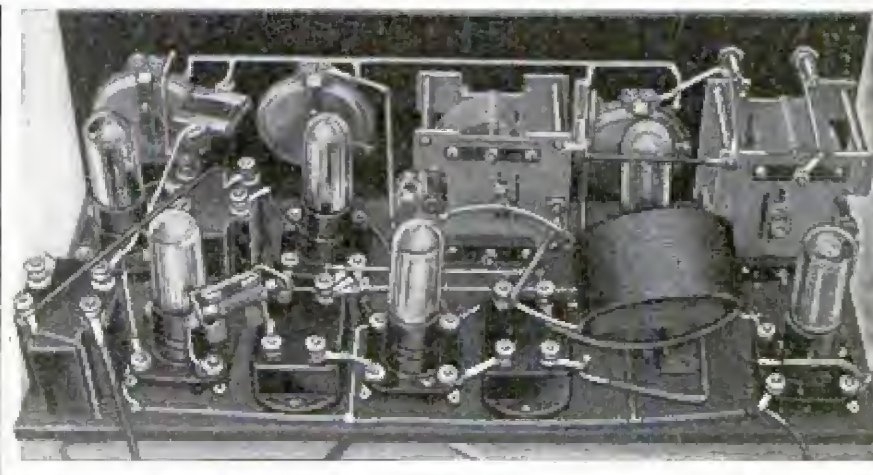
Crystal Stops Whistling Caused by Station Interference

Radio-transmitting stations equipped with piezo crystals to control oscillation do not cause the whistling interference due to beat frequencies. The bureau of standards states it has tested the applicability of the piezo oscillator as a frequency indicator in broadcast stations and found it useful and satisfactory. More and more stations are adding this device to their equipment and much of the former interference is being eliminated. As compared with the use of a frequency meter, or frequency indicator with a visual indicating device, the piezo-crystal oscillator has two important advantages which

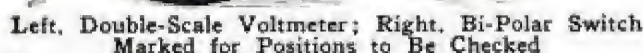
are at once apparent. First it is a particularly constant frequency standard, since, when properly designed, the frequency it delivers depends only on mechanical constants of the quartz crystal. Second, the indicator is unaffected by the degree of modulation of the station output, and finally it furnishes an indication of the variation in frequency directly by the pitch of the beat note.



on the potentiometer for best reception. Never advance the rheostats farther than necessary to obtain the best results. Phones can be plugged into the jack, automatically cutting out the horn, if desired; in fact, nothing has been overlooked that would add to the efficiency and convenience of the set, making it a really practical portable receiver.



Above, Rear View of the Completed Instrument Mounted on the Battery and Horn Compartment Ready for Placing in the Case; Below, Instrument Unit



the various points to be checked, as shown in the illustration, and is mounted on the front panel in the usual way. A device of this kind insures satisfactory and economical radio operation, making possible the use of tubes at proper filament voltages, and checks battery conditions so that the set can be kept in good shape at all times. If the instrument is used in a five-tube neutrodyne receiver, for example, it is possible to quickly regulate the filament voltages of the r.f. tubes, detector tube, the first and second a.f. tubes, and check the voltage of the A and C-batteries, the detector B and amplifier B-batteries.

For a number of years after the introduction of the three-element tube, the use of an extremely high resistance in series with the grid of the tube was mostly a matter of hit or miss. Wireless operators found that a pencil mark or a smear of ink connecting the grid leak to the grid element, made a great difference in the sensitivity of the receiver. Eventually manufacturers of radio equipment brought out small high-resistance units for this purpose. The gridleak is growing more and more important. Changes in tube construction, as regards the various voltages used for their operation, different types of filaments, and the numerous circuits, all mean a different value of gridleak for the most efficient operation.

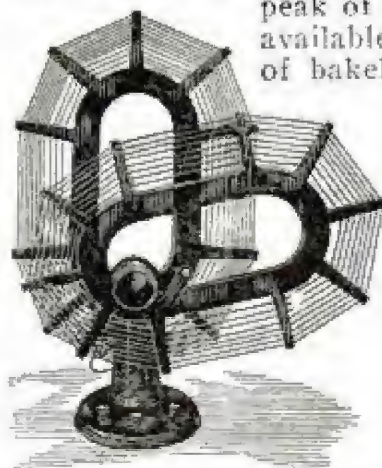
When the specifications call for a 1-meg. or 2-meg. gridleak, the designer means that one or two million ohms of resistance are required to enable the accumulated charge of the incoming signal

to leak off the grid of the tubes in time for the grid to be free for the succeeding electrical charge. The carburetor of the automobile is a good illustration of the same action; if the carburetor is fed too much gasoline, the motor is choked, and as a result stops, and similarly, if the gridleak allows too much of a charge to remain on the grid of the tube, it chokes or paralyzes. If the gridleak is of too low a value, decreased sensitivity results; the gridleak may be considered as a valve controlling the amount of electrical energy that the detector tube can efficiently take care of without overload. Any loose connection or minute electrical defect in the grid circuit will cause noisy, crackling reception, because, in the detector tube, the actual transforming of energy from inaudible to audible sound takes place in this tube and is amplified many times in the audio-frequency part of the set.

It will often be found that a gridleak of different value to that specified will better the performance of a receiver. This is not because the designer was wrong in his specification, but because individual tubes vary widely. It is a good plan to try the gridleak specified first, then experiment with other values, to determine whether another will work better or not.

Loop Tunes Receiver to Peak of Wave

A double loop covering the broadcast wavelengths and working only on the peak of the wave, is now available. The frame is of bakelite, wound with



phosphor-bronze wire. The loop can be used on any set which has radio-frequency amplification, whether tuned, untuned; reflex or straight. It is claimed to add selectivity and

aid in bringing in distant stations, and to work well with regenerative and neutrodyne sets.

Good, selective reception of radio programs cannot be expected when tuning is done in a careless and jerky manner. A slight touch on one of the dials is often sufficient to bring a station in distinctly or to lose it entirely, and a half-inch turn sometimes covers a dozen stations.

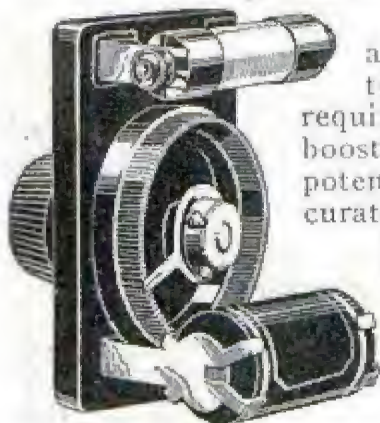
English, Whitman
P. 1. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845.

Soldering Headphone Tips

When the headphone tips become loose, which they often do in the course of hard usage, the amateur finds it a difficult job to resolder the ends into the tips. This is because the cords are formed of tinsel, which, owing to the thread woven in it, blackens and chars under the heat of the soldering iron, and makes a poor joint.

Remove the insulation for a length sufficient to enable the broken ends of the cord to be removed, plus the distance necessary to enter the tips for a new joint. Wind the new ends with a little piece of fine copper wire, about No. 35 or 36. Put a very little good paste flux on the wound ends. Now put a drop of solder in the tips, and, keeping the tips hot so that the solder remains liquid, push the ends of the cords into them; then remove the heat and allow the solder to harden. This will make a good, strong joint.

Carborundum Detector Is Self-Contained



Carborundum is a good stable detector, but as it requires an auxiliary boosting circuit and a potentiometer for accurate adjustment of the biasing voltage, it has not been much used. A new unit of the one-hole mounting type

and entirely self-contained overcomes this drawback. It consists of a cartridge containing the carborundum mounted between strong metal clips, a potentiometer, a flashlight cell below in a special mounting clip, and a small fixed condenser, which is connected between the center tap and the slider arm of the potentiometer. The circuit is connected, leaving but the usual input and output terminals.

Connecting Phone Cords

Best results are obtained when the positive wire of the phone cord is connected to the positive side of the B-battery. Some phones are stamped for proper polarity and others have one cord marked with a red tracer indicating the positive side. If they are not marked, try reversing the connections in the plug. The positive side will be indicated by the connection that gives the best results.

Loud Speaker Like Mirror

A combination of radio loud speaker and mirror is a novelty on the market.



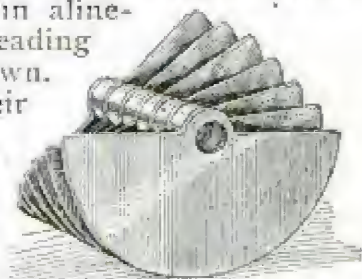
Loud Speaker Combined with Mirror; the Sound Is Deflected through an Opening at the Base of Mirror

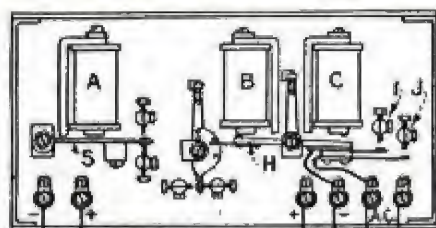
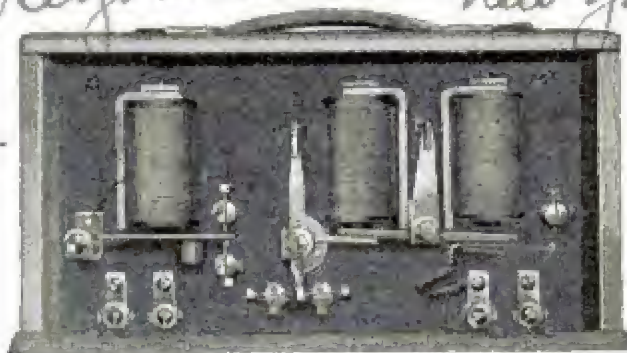
The instrument weighs 3 lb., is 10 in. wide and 11 in. high; its appearance, totally unlike any radio horn, will appeal to those who object to the usual type of loud speaker. A sound passage, $17\frac{1}{2}$ in. long, built like the voice passage of the human throat, gradually widens until it forms the mouth at the base of the mirror.

Making Your Condensers Straight-Line

When tuned to the highest broadcasting wave, the variable plates of the condensers on most receiving sets are not usually turned to maximum capacity, and unless they are of the new straight-line type, there is some crowding of the stations on the dial around the lower wave band. The fact that most condensers are of greater capacity than actually needed makes it possible to make them straight-line in effect by loosening the locknut that holds the rotor plates in alignment, and spreading them out as shown.

This reduces their capacity so as to give as much vernier effect as possible to low-wave stations, yet allow tuning in of the highest-wave broadcaster with maximum signal strength.—Glen F. Stillwell, Collinsville, Ill.





Automatic Switch for Connecting and Disconnecting Battery Charger, and Diagram Showing Operation

Automatic Switch for A-Battery Charger

An automatic battery-charger switch that connects and disconnects the charging system for the A-battery, is now available. The instrument is placed between the A-battery and the charger, as illustrated in the diagram. When the voltage of the storage battery falls below the point where further discharge would result in unsatisfactory reception and damage to the battery plates, the armature S drops, closing a circuit that energizes the coil C just long enough to pull the armature H into contact at I and J. When this occurs, the battery is on charge; when the battery is fully charged, the armature S rises, closing a circuit that energizes coil B, pulling up the armature H and breaking contacts I and J. This shuts off the charger.

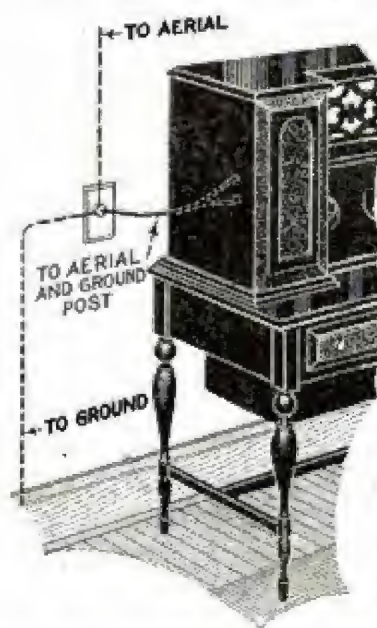
Binders for Coils

Shellac, when properly used, is quite satisfactory as a binding medium for homemade coils, in spite of the bad reputation under which it labors. The trouble usually has been in the method of application. Shellac should never be used as it comes in the bottle, but must be thinned with about an equal weight or volume of alcohol, in order to avoid a heavy, loss-producing coating. The thinner the shellac the better, provided the coating has the necessary binding qualities, and but one coat should be used, never more.

Collodion is also an excellent binder, and it too should be thinned as much as possible, using commercial ether for the purpose. The collodion must be used at once, as the ether evaporates quickly, especially in a warm room. Enamelled wire with a single covering of cotton forms a stronger coil than d.c.c. wire, for there is just enough cotton to enable the collodion to bind; with the d.c.c. wire, the same amount of collodion soaks into the cotton covering without binding, and more collodion must be applied, which is not desirable. The best way to apply the binder is to brush it across the wires with a $\frac{3}{4}$ or 1-in. brush, so that the binder runs in between all the wires. "Flexible" collodion should not be used, as it takes too long to dry. Keep all lights, cigars, etc., away from the collodion and the ether.

Using Wall Socket for Aerial and Ground Leads

A wall socket of the flush-plate type can be used as an outlet for the radio aerial and ground leads, making a neat installation. Lamp cord may be used from the prongs of the plug to the binding posts on the set, as shown in the illustration. The red tracer cord can be used for the aerial lead, and the prong marked so that the plug will be placed in the socket in the correct manner. Aerial and ground wires that are brought up between the



partition to the rear of the plate, are shown by the dotted lines. An installation of this kind does away with unsightly wires, and if necessary to move the set, it is a matter of a moment to disconnect the set by pulling out the plug. There is very little loss in this arrangement, and the writer has tried

it out with good results.—Clarence N. Roessl, Chicago, Ill.

■ A 1-TUBE ALL-WAVE RECEIVER with a range of 500 miles, was described in our Aug., 1924, issue, which will be sent to any reader upon receipt of 25 cents.

How to Get the Most from Dry Cells Used for A-Batteries

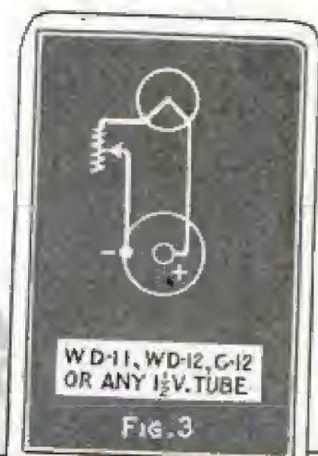
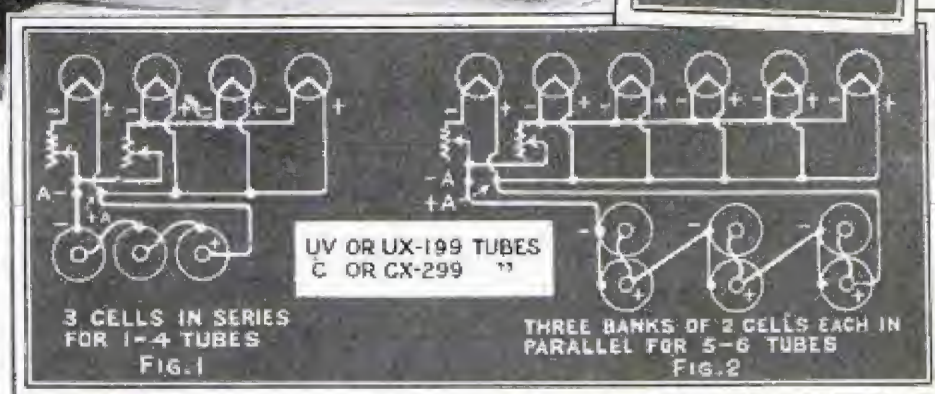
THE owner of a radio receiver using dry-cell tubes should know something about such cells and how to connect them, for in order to obtain the best results, the employment of the correct number of cells and their proper connection play a most important part. A dry-cell battery consists of one or more cells per-

3 volts, three dry cells are connected in series, as shown in Fig. 1. Connection in series means connecting the center or carbon post of one cell to the zinc or outside post of the next cell. From one to four tubes of this type can be operated in this way at a fairly low cost, which is approximated in the table. Three dry cells, costing \$1.50, will operate one tube approximately 700 hours at the stated



manently connected to furnish electrical energy to an electrical circuit. The combination and number differ for each type of tube, and the cells must be connected so that no single one is required to furnish more than .25 amp. The open-circuit "resting" voltage of a dry cell is about 1.5 volts; the carbon rod in the center, from which the current flows to the circuit, is the positive side and is indicated with a plus sign. The zinc can on the outside is the negative pole and is identified with a minus sign. Dry cells cannot be recharged after use like storage batteries and therefore must be connected so as to give the longest possible life.

Dry-cell tubes are the well-known UV-199, C-299 and similar types that are designed to put a very slight drain on the A-battery. These tubes require but 3 volts for their operation and only draw .06 amp. The new UX-199 and CX-299 tubes are of the same type but have standardized bases, the grid, plate and filament terminals being arranged in the same manner as on the standard 5-volt storage-battery tubes. To obtain the necessary

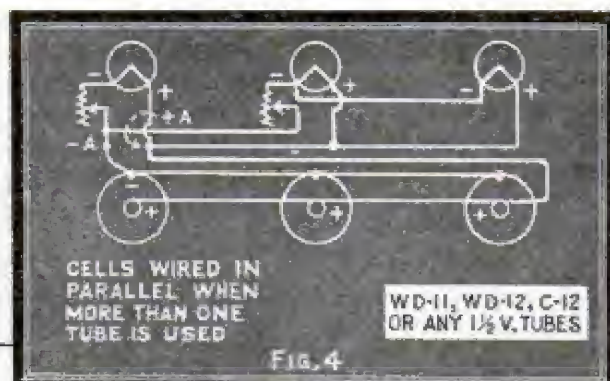


voltage and amperage, the cost being only 2½ mills per hour, and so on, in proportion, for the two, three and four-tube sets. Now if five or six tubes of this type are required, it is necessary to use six dry cells, as shown in Fig. 2, connected in three banks of two cells each in parallel, the three banks being connected in series. The output voltage still remains the same, but the amperage has been raised to accommodate the additional tubes. The first cost is then \$3 for the six dry cells, and the cost per operating hour for the five-tube set 1¼ cents and for the six-tube set 1⅓ cents.

The next tubes to be considered are the WD-11, WD-12 and C-12 types; these were our first dry-cell tubes. One dry cell is required for each tube and the tubes are commonly known as the 1½-volt type. Each draws .25 amp., which is the limit for one cell. The connections are shown in Fig. 3 for one tube; Fig. 4 shows how the

cells must be placed in parallel when more than one tube is used, a cell for each tube. The cells being connected in parallel, the .25 amp.-hr. drain will give the same approximate 110 operating hours for any

required for certain tubes, are shown more clearly by these diagrams than can be done by description. The chart is of value to the prospective buyer or builder of a radio set, as he can adjust the operating cost to suit his pocketbook. Knowing the approximate number of operating hours he can expect from his set, the time for renewal can be noted in advance, and by keeping a supply of fresh cells on hand, disappointment will be prevented when a good program is on.



Defective Connections in Tube Sockets Often Cause Poor Reception

Trouble with the radio receiver can often be traced to the little things that go wrong. The set may be wired correctly and all parts apparently in good condition, but if the tubes are not making perfect contact in the sockets, good results cannot be expected. From the time radio started, a great deal of trouble has been experienced

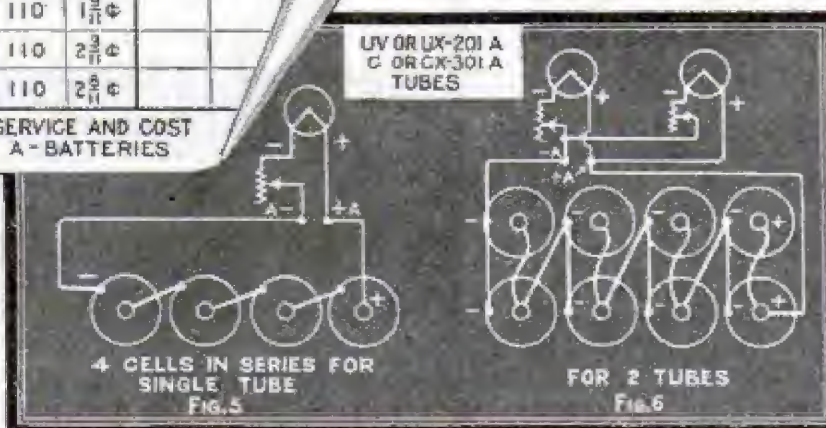
50¢ DRY CELLS		CONNECTIONS								
		FIG. 1-2			FIG. 3-4			FIG. 5-6		
TYPE OF TUBE	FOR	UV OR UX-199 C OR CX-299 DV-3			WD-11 WD-12			UV OR UX-201 A C OR CX-301 A DV-2		
		TUBE AMPS.	HRS.	COST PER HR.	TUBE AMPS.	HRS.	COST PER HR.	TUBE AMPS.	HRS.	COST PER HR.
1 TUBE		0.06	700	2 1/2 MILLS	0.25	110	4 5/11 MILLS	0.25	110	1 9/11 ¢
2 "		0.12	300	1 1/2 ¢	0.50	110	9 1/11 MILLS	0.50	110	3 7/11 ¢
3 "		0.18	180	8 3/11 MILLS	0.75	110	1 4/11 ¢			
4 "		0.24	150	1 ¢	1.00	110	1 9/11 ¢			
5 "		0.30	240	1 1/4 ¢	1.25	110	2 3/11 ¢			
6 "		0.36	180	1 5/11 ¢	1.50	110	2 8/11 ¢			

APPROXIMATE HOURS OF SERVICE AND COST PER HOUR OF DRY-CELL A-BATTERIES

number of tubes, the cost per hour for one tube being 4 5/11 mills and increasing in the same proportion for each tube used.

The 5-volt or A-tubes are not considered dry-cell tubes, although one or two of them can be operated with a dry-cell A-battery at a fairly reasonable cost, if a storage battery is not available. These tubes also draw .25 amp. per hour, and for the necessary voltage four dry cells connected in series are required for each tube, as shown in Fig. 5. For two tubes, eight cells are required, connected in four banks of two cells in parallel, the four banks being connected in series. The chart shows the operating cost per hour for the two A-tubes has reached 3 7/11 cents, as \$4 worth of dry cells are in use; not a very economical method.

It will be well for the user of dry-cell tubes to follow the diagrams carefully with reference to the particular type of tube used in the set in order to obtain maximum efficiency from dry cells. Parallel and series grouping of dry cells, as



with poor contacts between the tube prongs and the socket springs. Noisy reception, fading signals, and poor volume can usually be traced directly to this defect. Much of this trouble in the past has been due to faulty design, and the manufacturers are making many improvements in sockets that are largely eliminating this form of trouble.

The tube prongs are composed of brass, with a small bit of solder at the tip. Most socket springs are of phosphor bronze, designed to bend upward and make contact against the soldered tip of the tube prongs. The soft solder of the tube-prong tips wears off and soon coats the socket contact with a lead oxide, making a very poor electric contact, and consequently a noisy set. Also, the spring soon loses its resiliency and becomes set, failing to ex-

ert sufficient upward pressure against the prongs of the tubes, and again trouble starts.

Many of the new sockets are provided with side-wiping contact springs that make a good firm contact, gripping the prong tightly. Some have both an end and side contact, making doubly sure of good contact. Where the socket is suspected, bend the socket springs so that they make good contact with the tube prongs, taking care first to disconnect the batteries from the set. Clean off all the discoloration from the tube prongs, both sides and bottom, with fine sandpaper, and clean the wiping surfaces of the socket springs in the same way.

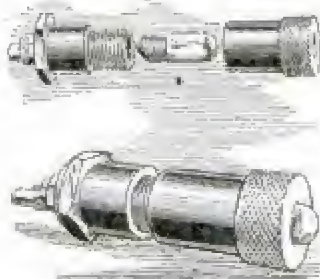
Single Lead Avoids Dead-End Losses

A simple and direct method of connecting a tuning coil so as to eliminate dead-end losses, is illustrated in the drawing. A single flexible lead is used and is fitted with a clip at its free end. Direct connection is easily made to any tap by means of the clip. This makes effective use of the working portion of the coil, as no losses are introduced through unused wire and repeated connections. The taps are readily accessible.



Tube-Protector Lamp Warns of Excessive Current

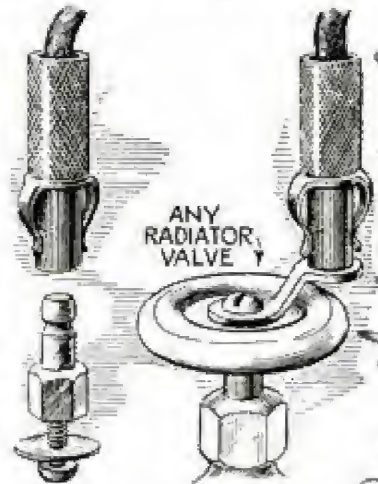
A small signal lamp which is designed to warn the operator whenever excessive drain of current occurs from the B-battery is now on the market. When too much current flows from the battery, the bulb lights up, indicating that something is wrong in the set. It is made for panel mounting and can be used in any type of battery-operated radio receiver; the upper illustration shows the cap removed for mounting.



Volume and selectivity can be greatly improved in any receiving set by placing a variometer in the ground lead, not shunting it, but connecting it in series. This will also serve fairly as a wave trap and will not change the wavelength of the set.

Solderless Snap Terminals for Quick Connections

Snap terminals that require no soldering are now available. These connectors make positive contact and are recommended for panel, ground and battery leads. The method of obtaining a quick ground on a radiator valve is shown in the illustration. This special stud is tapped and furnished with an 8-32 screw and washer; the same base stud fits all B-batteries equipped with screw posts.

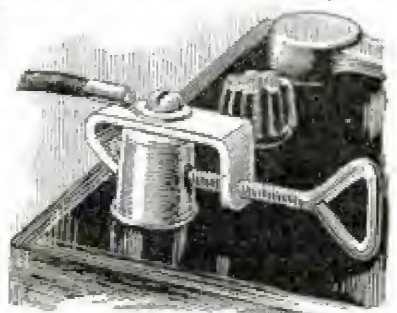


Winding R.F. Transformers

The winding of r.f. transformers is not difficult, but the instrument must be designed for the capacity of the variable condenser used with it. For a .0005-mfd. condenser the primary winding consists of 10 turns of No. 32 d.c.c. or d.s.c. wire wound on one end of a bakelite tube, 3½ in. long and 3 in. in diameter. The starting end will be the positive B and the other end the P-terminal. Leave a ½-in. space for the secondary and wind 42 turns of No. 24 d.c.c. wire; the start will be the F-terminal and the end the G-terminal.

Handy Clamp Fits All Battery Terminals

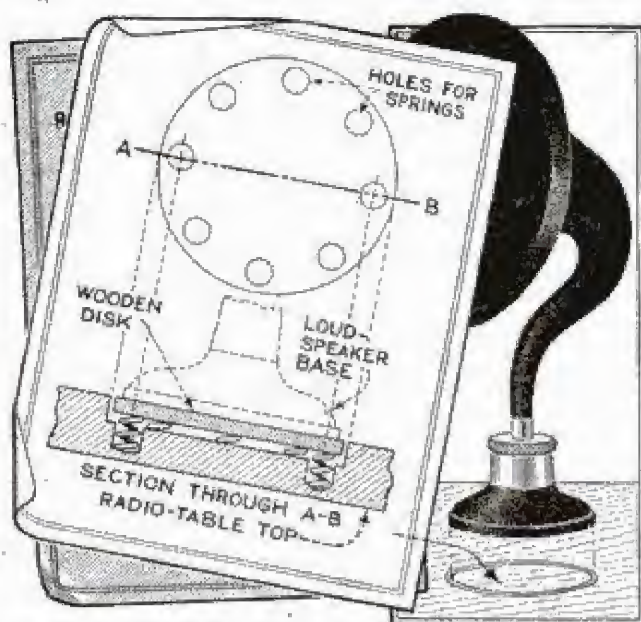
A clamp that will fit all types of storage-battery terminals is a new utility. The clamp makes a positive contact by means of a thumbscrew on any type of terminal, such as batteries that are not provided with wingnuts for fastening the leads and the auto-type of battery in common use. These latter have smooth terminals, as shown in the illustration, with which a good and easily removable connection could scarcely be made except by means of a clamp.



*Ray's Auto Supply Co.
Bloomfield, N.J.*

*Apco Int'l. Co.
154 Nassau, New York*

*Barion-Kramer Co., Inc.
238 W. 53rd St.*



Shock-Absorbing Mounting for Loud Speaker in Table Top and Details of Construction

Shock Absorber Mounting for Loud Speaker

All radio fans who take pride in the type of equipment they employ will appreciate the shock-absorbing mounting for the loud speaker illustrated herewith. Any radio cabinet or table can be equipped with it at very small cost. The results in better tone quality, free from the usual singing vibrations present in most horns when used on the same table with the set, will amply repay the fan for the slight amount of work necessary.

A wooden disk is supported on eight small brass springs which can be purchased at any hardware store. These springs are held in an upright position in the eight holes countersunk in the recess, as shown in the sectional diagram. The wood disk should be slightly larger than the base of the horn; the thickness of the disk will depend on the depth of the recess which should be just sufficient to bring the top of the disk flush with the top of the table. The diameter of the recess should be slightly larger than the diameter of the wooden disk; a circle can be marked off with a suitable gouge or scribe and the necessary portion chiseled out carefully so as to keep a clean edge that can be sandpapered off smoothly. The holes for the springs can be countersunk with a wood bit of the proper diameter to take the springs snugly.

Locating Noises in Receiver

Crackling and scratchy noises from the loud speaker are generally easy to locate and remedy. The commonest and simplest method of doing this is to proceed by

elimination. Determine first if the noise is due to an outside source by disconnecting the aerial from the set; if the noise stops immediately, the trouble is not in the set but may be caused by some electrical disturbance in the neighborhood. Another good test is to throw the set out of resonance; if it is of the common tuned r.f. type, set one dial at 0, the next one at 50, and the third one at 100. If the noise still persists, look for trouble in the set or batteries. To test for noise in the batteries, use a pair of headphones, placing one tip on the negative terminal and the other on the positive, getting a sharp click, then no noise whatever. If there is a swishing and crackling sound the battery is probably defective, and should be replaced with a new one.

Noise in the set is often caused by poor contact of the tubes in the socket, dirty prongs and clips often preventing good reception and causing crackling sounds in the horn. Broken or frayed loud-speaker cords cause trouble, and poor results may be traced to wrong polarity of the horn connections in the jack. Try reversing the leads in the horn plug, or get a plug marked for polarity. The red tracer cord from the horn goes to the positive connection in the plug.

Fuse Safeguards Radio Tubes

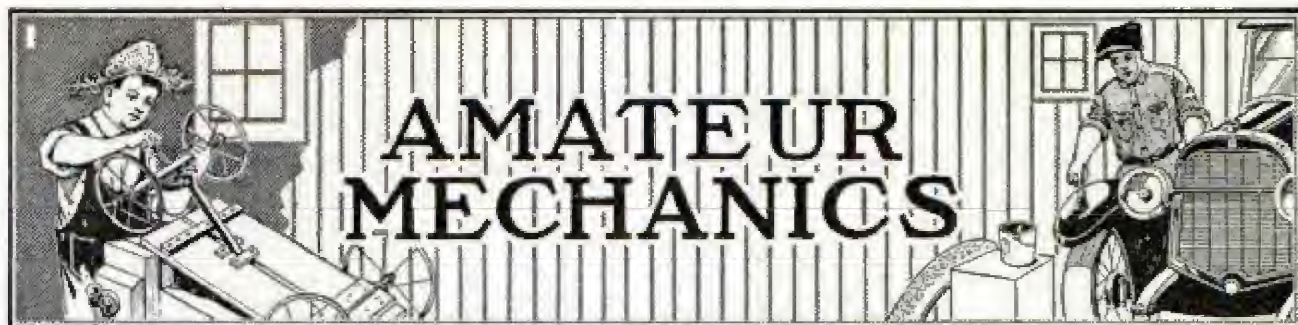
A fuse designed to prevent the burning out of radio tubes due to excessive current has appeared on the market in a handy form. The base is of insulating



material and has two spring clips to hold the fuse firmly in place. The outer ends of these clips are designed to provide for attaching the wires by soldering. The fuse element, contained in a glass tube, is always visible

and spring terminals engage securely with the clips in the fuse base. The illustration shows the fuse and block ready to install in the circuit. As there is always a chance of accidentally shorting the high-voltage B-battery into the A-battery and burning out the tubes, the fuse safeguards against such losses.

*Chicago Radio Supply Co.
East*



How to Make a Telegraph Buzzer

By J. EARLE MILLER

THE shrill buzzing dots and dashes which have puzzled thousands of radio listeners may be learned at home with a simple outfit consisting of a fifty-cent doorbell buzzer, a couple of dry cells, a pair of binding posts, a small board and a scrap of spring brass. With two similar sets two-way house-to-house or room-to-room communication can be maintained.

Wireless telegraphy differs from wire telegraphy in two important essentials. The code used is the so-called continental, or international Morse, instead of the old Morse code used on land wires; and instead of a telegraph sounder the buzzer best imitates the dots and dashes as heard in the radio receivers. A very high-pitched buzzer is needed. Most doorbell buzzers are low-pitched, but this can be corrected by sticking a scrap of paper in the air gap to change the tone.

The base is made from $\frac{3}{4}$ -in. board 5 by 7 in. in dimensions. A $\frac{1}{4}$ -in. bevel planed around the top edges improves

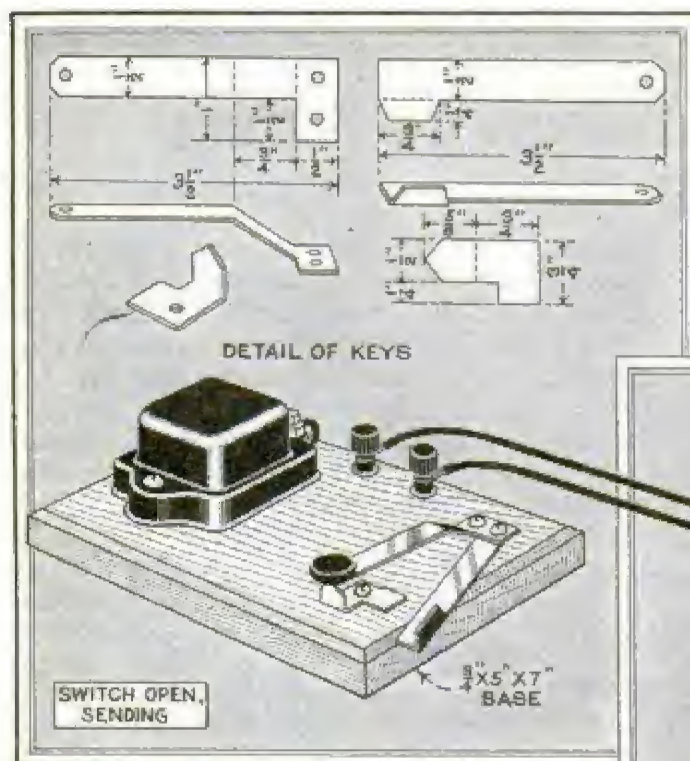
the appearance. For the key a scrap of spring brass, $\frac{1}{16}$ in. thick and $3\frac{1}{2}$ by $2\frac{1}{2}$ in. in size, will be sufficient to form the three parts, key, contact point and switch. Starting with the key arm, cut an L-shaped piece, $\frac{1}{2}$ by $3\frac{1}{2}$ in. long with a $\frac{1}{2}$ -in. square projection at one end, as shown in the drawing. The projecting arm fits over the switch and forms an electrical connection between the two. The switch

is $\frac{1}{2}$ by $3\frac{1}{2}$ in. with a $\frac{1}{4}$ by $\frac{3}{4}$ -in. projection at one end. Clip the corners of the projecting piece at an angle, and bend it up at right angles to the main arm to form the lever by which the switch is opened and closed. The key arm is bent up at a 45° angle $\frac{1}{2}$ in. from the end and bent back $\frac{3}{4}$ in. away, as shown in the sketch. The contact is also L-shaped, with a main arm $1\frac{3}{8}$ by $\frac{1}{2}$ in., and a projecting arm $\frac{1}{4}$ by $\frac{1}{2}$ in. Mark a line $\frac{5}{8}$ in. from the end of the longer arm and bend the end up at right angles, then, with the tin-ner's snips, clip

INTERNATIONAL MORSE CODE		
ALPHABET	CHARACTERS	NUMERALS
A .-.-	* COMMA .-.-.-	1 .-.-.-
B -.-.-	• PERIOD .-.-.-	2 .-.-.-
C -.-.-	; SEMICOLON .-.-.-	3 .-.-.-
D .-.-	: COLON .-.-.-	4 .-.-.-
E .	? INTERROGATION .-.-.-	5 .-.-.-
F .-.-	! EXCLAMATION .-.-.-	6 .-.-.-
G .-.-	- HYPHEN .-.-.-	7 .-.-.-
H .-.-	= DOUBLE DASH OR BREAK .-.-.-	8 .-.-.-
I .-	- LINE INDICATING FRACTION .-.-.-	9 .-.-.-
J .-.-.-		0 .-.-.-
K .-.-		SPECIAL SIGNALS
L .-.-		INVITATION TO TRANSMIT .-.-.-
M .-		TRANSMISSION FINISHED .-.-.-
N .-		RECEIVED (O.K.) .-.-.-
O .-.-		ERROR (SERIES OF DOTS) .-.-.-
P .-.-		WAIT .-.-.-
Q .-.-.-		UNDERSTAND .-.-.-
R .-.-		END OF EACH MESSAGE .-.-.-
S .-		
T .-		
U .-		
V .-.-		
W .-.-		
X .-.-.-		
Y .-.-.-		
Z .-.-.-		

the corners off to form the contact point. The knob of the key may be cut from $\frac{1}{4}$ -in. bakelite, or from wood. Bakelite is better, provided you have taps to thread the hole for the machine screw which attaches it to the key arm. Saw out a $\frac{5}{8}$ -

screw holding the key. When the assembly is completed the wire and hole will be entirely hidden. Midway between the key and buzzer, drill two holes, $\frac{3}{4}$ in. apart, for the binding posts, using a No. 27 drill. Turn the base over, and with a $\frac{1}{2}$ -in. wood bit, drill out the binding-post holes to sufficient depth so that the nuts can be screwed onto the shafts. With a short piece of ordinary bell wire or of the flexible rubber-covered wire used in radio sets, connect the right-hand binding post with the key, cutting a groove in the bottom of the base, connecting the two holes, to carry the wire.



in. circle of bakelite, and bevel the top edge slightly. Drill a hole $\frac{3}{8}$ in. deep, using a No. 32 drill and taking care not to go all the way through the knob; tap it with a 6-32 tap, saw a machine screw of that size off to the right length, and attach the knob through a No. 27 hole drilled $\frac{1}{4}$ in. from the end of the key arm. Drill two No. 27 holes in the other end, as shown in the sketch, one to take the wood screw which holds the key to the base, and the other for the wood screw holding the switch arm. One No. 27 hole, as shown, is drilled in the contact piece and another in the end of the switch arm.

You are now ready to assemble the key and buzzer on the base. Lay the buzzer in place $\frac{1}{4}$ in. from the left-hand end of the base and mark the location of the holes for the two wires. Drill them, using a No. 27 drill, through the board. Place the key arm on the board so the left-hand hole comes 2 in. from the end of the base and $\frac{3}{4}$ in. down from the rear edge, and mark the location of the two screws. Lift the arm away and drill a No. 27 hole through the wood $\frac{1}{4}$ in. in front of the left-hand screw hole. The wire to the key is passed from below through this hole and is twisted around the wood



Screw the key in place. Place the contact point beneath the end of the key arm, so that when the latter is pressed down, the point will make contact between the screw head holding the knob and the end of the key arm. Mark the location of the screw hole holding the contact strip, swing the key out of the way, and drill another wire hole, similar to that at the key end. Cut a groove along the bottom of the base connecting this hole with the left-hand buzzer-wire hole, and run a wire from the buzzer connection to the contact point. Form a loop in the end and pass the wood screw attaching the contact strip through the loop, screwing it down tight to the board. The side extension of the contact strip should be bent up slightly so that the switch arm can slip under it, or it may be filed thin, from the bottom, for the same purpose. Attach the switch arm with a wood screw through the right-hand hole in the base of the key arm. Finally, cut a groove on the back of the base and run a

wire from the right-hand binding post of the buzzer to the left-hand binding post on the base.

That completes the assembly. Connect a pair of dry cells in series, and run the leads from them to the two binding posts. The switch is to be used only in two-way communication. When practicing with a single set, it remains open at all times. When the key is pressed, it establishes contact and closes the circuit. The key arm should be bent, after assembly, until it leaves a gap of about $\frac{1}{8}$ in. above the point.

If two buzzers are to be used for two-way communication between houses or rooms, one of the battery lines, instead of going to the binding post, runs to a post on the other buzzer, and the wire from the second post comes back to the vacant post

on the first set. If the line is long, it may be necessary to install batteries at both ends to overcome current losses due to wire resistance.

The international code, shown here, is not hard to learn. The symbols for each letter should first be memorized and practiced until you can write them down or up the alphabet, or at random. Next, practice them slowly, taking care to cut dots and dashes clearly, and remembering that a dash should be twice the length of a dot. Listen to the sound, and gradually you will learn to recognize the letters by their rhythm, instead of counting the dots and dashes. A good operator learns that the sound of zz zzzz, for example, means A, just as the child in school learns that the sound of A means the first letter in the alphabet.

Keeping Flies from Cattle

Summer heat is oppressive to farm animals but flies make conditions worse. However, the latter can easily be eliminated by spraying the animals with a strong solution of catnip; it is boiled in water for 20 minutes and then allowed to cool before using. After the animals have been sprayed with this solution, flies will stay away from them.—A. Jeffers, Bedford, Ind.

Emergency Blow-Out Repair

Repairing a large blow-out without the proper facilities is a rather perplexing job. Patches will not mend such a break satisfactorily, but the emergency repair shown in the drawing was found highly successful and will be of benefit to other motorists in a similar predicament. The tube was cut through at the blow-out and each end was rolled up carefully as indicated, after a liberal coating of rubber cement had been

applied. A fine wire was twisted around the rolled end as tightly as possible, the ends of the wire being turned over with the pliers to protect the tube from being punctured. After replacing the tire on the wheel,



about 15 lb. of air was pumped in and the trip to the nearest service station, a distance of at least 12 miles, was made successfully, only two stops being necessary

to replace air lost by slow leakage.—Harold Benson, Boulder, Colo.

Buggy Top on Cultivator Frame Lightens Labor

There is no need of riding a cultivator in the sun's hot rays when an old buggy



Old Buggy Top Makes a Good Shade on Cultivator and Provides Comfort for the Worker

top is available. This can easily be attached to provide shade. The back is removed and the braces are bolted to the frame of the cultivator just below the level of the seat. To prevent breaking the knuckle joint, a few guy wires are run from the bows of the top down to the cultivator frame.—J. R. Simmonds, Albany, New York.

Guard on Sickle Protects Hands

Finding that some stones and the sharp stubble of cut weeds skinned her hands, a young woman gardener had a guard put on the sickle, as shown in the illustration.



Wire Guard on Sickle Protects Knuckles from Injury on Stones and Weeds

A heavy piece of wire was bent to form a loop, twisted and then attached to the tang of the blade as shown. The loop bends over all uncut weeds, thorny or otherwise, and protects the hand from stones and short stubble.

Chicken-Feed Hopper

On a poultry farm near Cloverdale, Ind., novel feed hoppers, made from old barrels, are in use. The platforms on which these feeders stand are about 5 by 5 ft. in dimensions and are solidly built. A box, about 4 in. deep, is built on the platform and the barrel is set in it, open end down, so that it is held about 3 in. above the floor of the platform, which permits the dry mash to feed downward. The distance between the edge of the barrel and the box is about 5 in., which gives the chickens plenty of space to eat out of the trough and keeps them from getting into the feed with their feet. Each feeder will accommodate



Novel Chicken-Feed Hoppers Used on a Large Poultry Farm Prevent Waste

about 30 hens at one time. The funnel-shaped covers, which keep the hens from roosting on top of the barrels were made by a local tinsmith for about 75 cents each. The barrels make very economical and practical feeders and take up little space.

Keeping Goldfish Healthy

Because of its narrow neck the so-called fish globe is not adapted to keeping goldfish in a comfortable and healthy condition, its small amount of water surface not permitting the process of absorption of air on a scale sufficient for the well-being of the fish. Another objectionable feature of the globe lies in its reflection and refraction of light rays, which tend to make the fish nervous and uneasy. An aquarium with straight sides is the most suitable for goldfish. It should be of rectangular shape and of equal width at the top and bottom. The rectangular battery jar, which may be purchased in the 5-gal. size, will give good results. The depth of water should be about the same as the width of the aquarium, and the bottom should be covered with clean sand and gravel to a depth of 1½ in. Ordinary washed sand and pebbles are best for this purpose, as the more desirable aquarium plants draw most of their nourishment from the water and require merely an anchorage. In order to insure an abundant air supply, plants of high oxygenating powers should be selected for the aquarium. Cleanliness, good light, plants well distributed over the bottom, proper food in moderate quantity, scavengers, prompt removal of sick fish, and avoidance of overstocking are the essential factors for the maintenance of a successful aquarium. Thousands of goldfish have been killed by the lack of observance of one or more

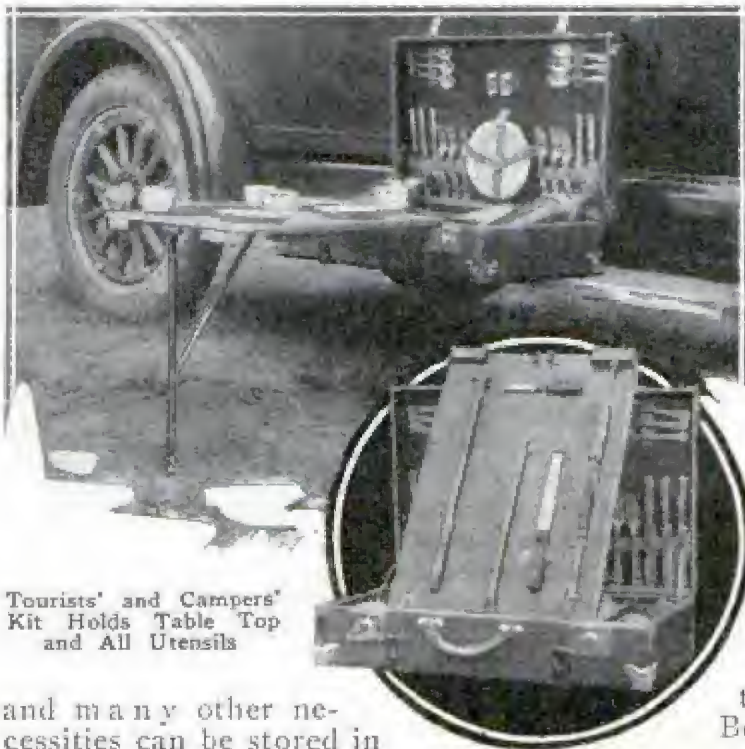
of these simple rules, and many are lost through mistaken kindness. To put the globe in the sunlight makes it a veritable torture cell. The fact that goldfish can endure a great deal in the way of unwholesome environment is not an excuse for torturing them. With proper care they will attain a great age.—U. S. Bureau of Fisheries.

Washing Paint Work

One of the annoying troubles of the home owner who does house cleaning himself is that painted walls, after being washed may present a streaked appearance that makes the work look worse than before it was washed. This can easily be prevented. The whole secret is to have a dry, clean rag at hand, and when a section of the wall is washed, to dry it off, rubbing the cloth over the wall only in the direction of the original brush marks. The surface of the paint is a series of minute ridges, formed by the brush marks, and if the drying rag is rubbed across the marks the dirt is left in the hollows. Rubbing only with the brush marks takes up all the dirt.

Table Top Fits in Lunch Kit for Tourists and Campers

Tourists and campers will find considerable convenience in the combination table and lunch kit shown in the photo. When not in use, the table top fits inside of the kit and the underside has clamps, so that the table leg, brace, paring knife and bread knife, can opener, etc., can be held there securely. The cover has facilities for holding spoons, knives and forks,



Tourists' and Campers' Kit Holds Table Top and All Utensils

and many other necessities can be stored in the kit. In use, it is set on the running board of the car, and one end of the table top is attached to the kit, while the other is supported by lengths of pipe, forming a leg and brace.—E. R. Jacques, Liberal, Kans.

Novel Bird Cages

Attractive bird cages of any shape, size and design have been made from sheet-



Ornamental Bird Cages Made of Scrap Sheet Brass Left Over from Punch-Press Work

brass scrap, left over from punch-press work. The pieces can be obtained in all kinds of symmetrical designs and are soldered together as shown in the photo. Ordinary pie tins are used for the bottom and top, and serve to strengthen the cage. After the cage is completed, it may be electroplated to cover all the soldered joints and, if desired, the top and bottom can be enameled or otherwise treated to facilitate cleaning.

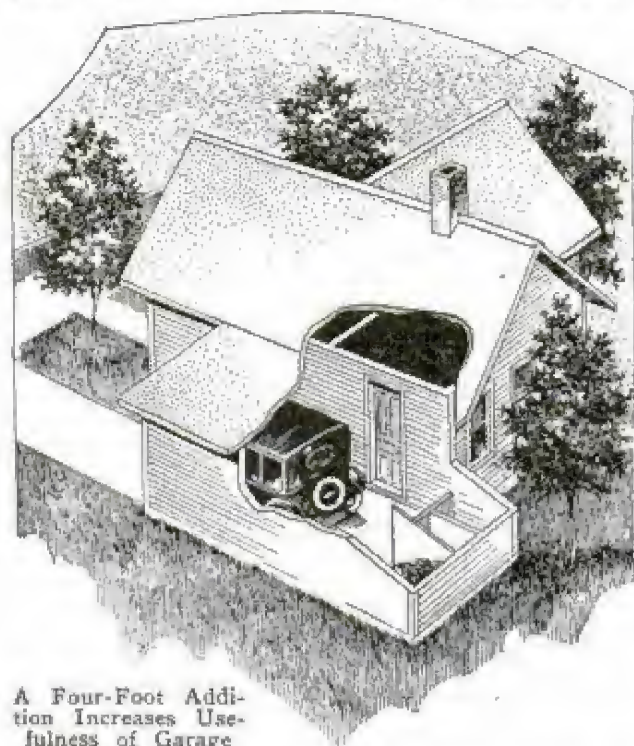
Getting Rid of Rats

Several months ago rats were so numerous on our farm that I had to take measures to eliminate them. I placed pans half full of cornmeal or flour in places where the rats were most liable to come, but where live stock and chickens had no access. The rats soon learned where these feeding pans were located and came regularly. After a few nights of real feeding, I mixed cement with the contents of the pans, about one part of cement to every five parts of meal or flour. The rats cleaned the dishes without any suspicion, and when later on they became thirsty and drank the cement set and resulted in death to a great number.—Mrs. R. Brickly, Bedford, Ind.

☞ Starched clothes sometimes stick to the hot iron while being pressed; to prevent this, a little alum should be added to the starch before the hot water is poured over it.

Double-Duty Garage

By extending the floor dimensions 4 ft. past the rear end, the garage shown in



A Four-Foot Addition Increases Usefulness of Garage

the illustration offers a storage place for the garden tools, coal, oil and gasoline. The kitchen door opens directly into the garage so that the storage space is readily accessible. The addition need only be a few feet high and the roof can be made removable so that a good scratching shed can be provided for chicks during hatching time. In this case the regular top is removed and a frame covered with canvas or glass is substituted.

Self-Dispensing Shoe-Polish Dauber

Liquid shoe polish is generally used by women and children and the dauber provided for applying it is rather messy and



inconvenient. To eliminate this drawback drill a small hole through the center of a cork of suitable size and glue a piece of rubber sponge over the top as shown. A round-headed pin is inserted through the

hole in the cork from the lower side and bent to provide a hook end within the

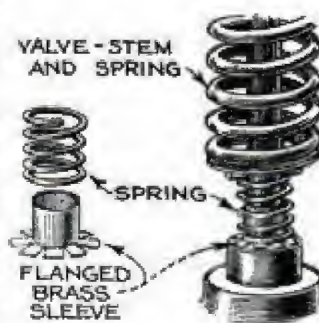
sponge. The elasticity of the sponge holds the head of the pin firmly against the cork, keeping the hole closed, but when the bottle is inverted and the sponge pressed firmly against the shoe, the improvised valve opens sufficiently to allow the liquid to flow. Releasing the pressure closes the valve again.—G. E. Hendrickson, Argyle, Wis.

Uses for Salt

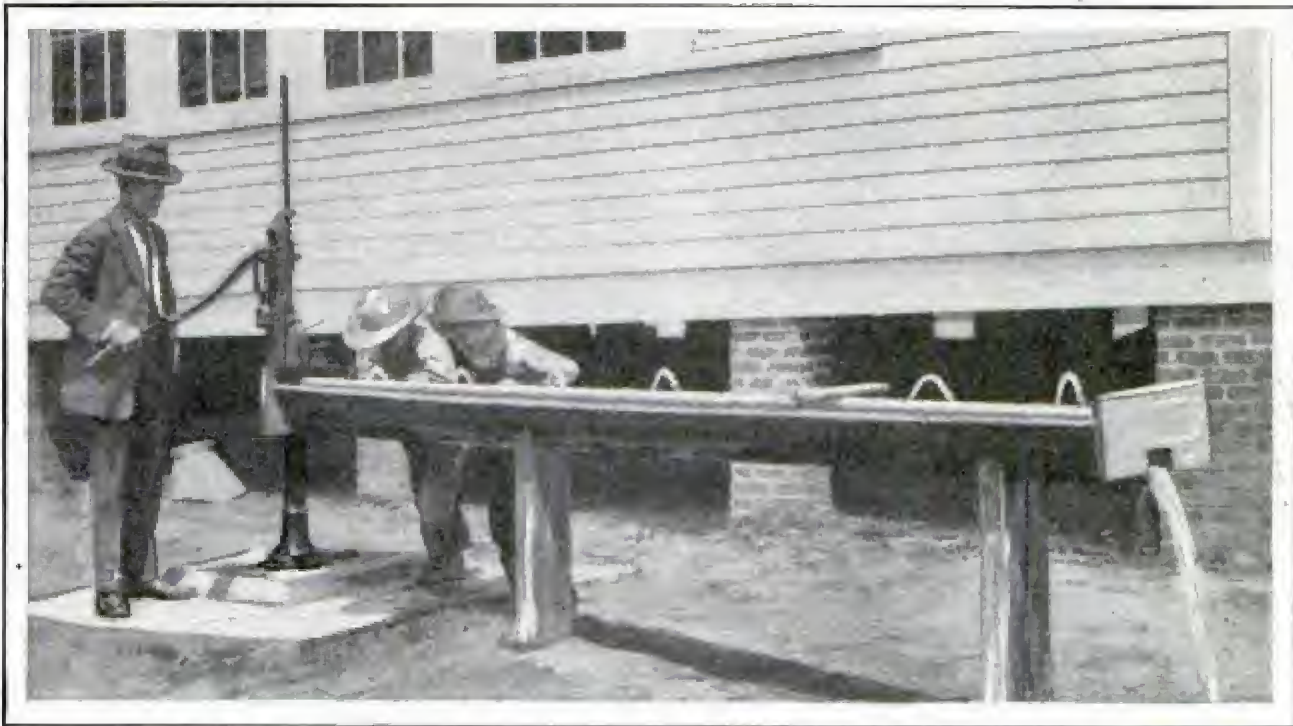
Brass can be readily cleaned with a solution of salt and vinegar. A saturated solution of salt in water when washing clothes will prevent colors from running. Salt should be added to water before spaghetti, potatoes or vegetables are boiled in it. A speck of salt added to cream helps in whipping. An excellent throat gargle, which is highly recommended by physicians, is salt water. To keep clothes from freezing on the line add salt to the rinsing water. Salt eaten with nuts aids digestion. Egg stains on silver can easily be removed with the use of salt. Carpets can be cleaned easily and will look brighter if salt is sprinkled on them. Rust stains can be removed by rubbing salt and lemon on them and then drying in the sun.—Mrs. Nina Jeffers, Bedford, Ind.

Silencing Ford Valves

Valves on Fords and other motors which are of the non-adjustable type, become noisy after some use. Much of this noise is caused by wear on the end of the valve stem or tappet. It can be eliminated or absorbed by using a short length of thin brass tubing, just large enough to slip over the valve stem, and a coil spring a little larger in diameter than the tubing. With a fine-toothed hacksaw, the tubing is cut across the end in three or four places to a depth of $\frac{1}{8}$ in. or a little more, care being taken to see that all the cuts are of the same depth. The segments formed in this way are bent out at right angles to the wall of the tubing and the tube is cut off to a length of about $\frac{1}{4}$ in. Eight tubes, one for each valve stem, are required. The springs should be of fairly strong stock and should be cut about $\frac{1}{4}$ in. longer than the distance from the pinhole in the valve stem to the end of the stem.



hole in the cork from the lower side and bent to provide a hook end within the



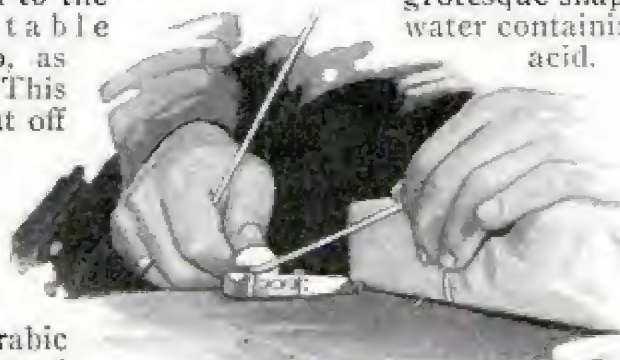
Sanitary Fountain for Country Schools Provides Opportunity for Several of the Pupils to Slake Their Thirst at the Same Time, and Is Simple to Make and Install

Eight of these are also required. The springs are placed on the flange made by the bent-out segments, as shown. The valve is lifted and the assembly placed over the bottom of the stem. In operation, these additional spring cushions absorb the noise caused by the blow of the valve tappet on the end of the valve stem. The brass sleeve serves to prevent the end of the spring from working under the end of the stem and causing a valve failure. This could happen in a case of excessive wear or in case the end of the valve tappet is worn cup-shaped, and would then have a tendency to force the end of the spring under the end of the valve stem. —Leon D. Quick, Milesburg, Pa.

Can Opener Is Convenient Twine Cutter

Can openers are used by a concern in San Francisco for cutting string and cord. The opener is screwed to the top of the wrapping table with the blade up, as shown in the photo. This enables the clerk to cut off the string easily and quickly, and no part of the opener can catch into anything.

■ A solution of washing soda, gum arabic and water makes a good writing fluid for fine lines on blueprints.



Can Opener Screwed to Top of Wrapping Table for Cutting Twine

Sanitary Drinking Fountain

At a country school where all drinking water comes from an ordinary pump, a sanitary fountain of the kind shown in the photo will be found convenient. It consists of a length of pipe with $\frac{1}{4}$ -in. holes drilled about 14 in. apart, so that quite a number of children can drink at the same time.—R. G. Thackwell, Chicago, Ill.

Odd and Grotesque Photos

Amusing photos, which are odd and grotesque and are puzzling to the layman, can be made by taking the negative direct from the wash water and warming it slightly over the stove until the emulsion starts to run. The negative should be held on edge, and as soon as it is warm, be removed from the stove, or the emulsion will slide entirely off the base. Warm it only enough so that the image assumes a grotesque shape and then dash in cold water containing a few drops of acetic acid. The acid hardens the emulsion and prevents it from being damaged. A thorough rinsing and drying completes the process, whereupon the negative is ready to be printed in the same manner as if it had been untouched.—L. C. Ferguson, Ontario, Calif.



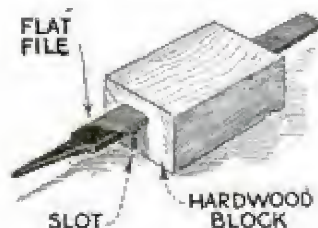
Effective Method of Watering Built-Up Flower Beds Which Insures Plenty of Moisture

Underground Irrigation for Flower Bed

In building up flower beds, underground irrigation is usually most practical. When the bed is on the level, ordinary watering is sufficient but when the bed is raised the underground plan will insure luxuriant growth, regardless of insufficient rainfall. A system of porous tile, as shown in the illustration, is laid out on the ground with the inlet high enough. The ends of the laterals must be plugged. After the bed has been sodded down or the plants assume natural growth, the inlet need not be conspicuous at all. The tile is filled with water twice a week.

Saw Jointer Easily Made from File

Saws should be jointed before setting or filing in every case. Jointing is nothing more than filing the ends of the teeth down until they are all even. A good jointer, that will answer ordinary purposes and which is easily made, consists of a hardwood block cut out so that a flat file can be inserted. A slot is also cut to receive the saw. In use the saw is drawn through this slot and the teeth will soon be filed down evenly.

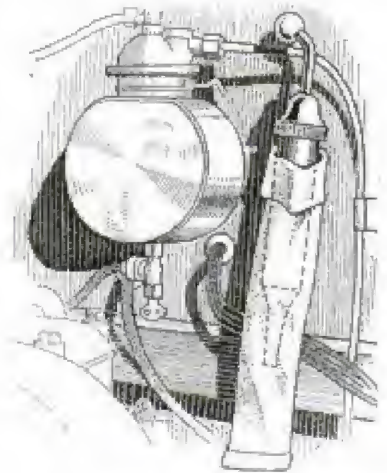


Renewing Typewriter Platens

Typewriter platens, which have become worn from constant usage, can often be greatly improved with a little effort and a few sheets of emery cloth. The carriage, which holds the platen, is removed and the roller is smoothed down with a coarse emery cloth. After the pits are removed, a finer grade of emery is used on the roller until the working surface is as smooth as it can be made. Sandpaper is not recommended for this purpose as the sand comes off too easily and is sure to cause more or less trouble.

Sheath for Carrying Oil Gun in Auto Is Convenient and Timesaving

My car was provided with a pair of brackets under the hood for carrying the oil gun, but using the gun after I had driven a few miles over a dusty road meant that a cleaning must inevitably follow. An alternative was to carry the gun under the seat, but that exposed it to damage from the other tools, gave it a chance to leak at the plunger rod, and meant the seat would have to be removed at every oiling. Both cleanliness and accessibility were obtained by cutting a piece off a discarded motorcycle inner tube and fastening the open end to the hood side of the dash, just over the steering post.



Into this sheath the oil gun was easily slipped, and was also easily removed when needed.—C. Lynndelle, Trenton, N. J.

Removing Paint from Windows

Hardened spots of paint can easily be removed from windows without using a knife, which might scratch the glass, or strong soda solutions, which might drop on the wood and eat off the paint. Take an ordinary silver quarter that is not much worn, hold it firmly against the glass and rub it over the paint spots, which will quickly disappear.—James E. Noble, Toronto, Can.



Wiring Your Home

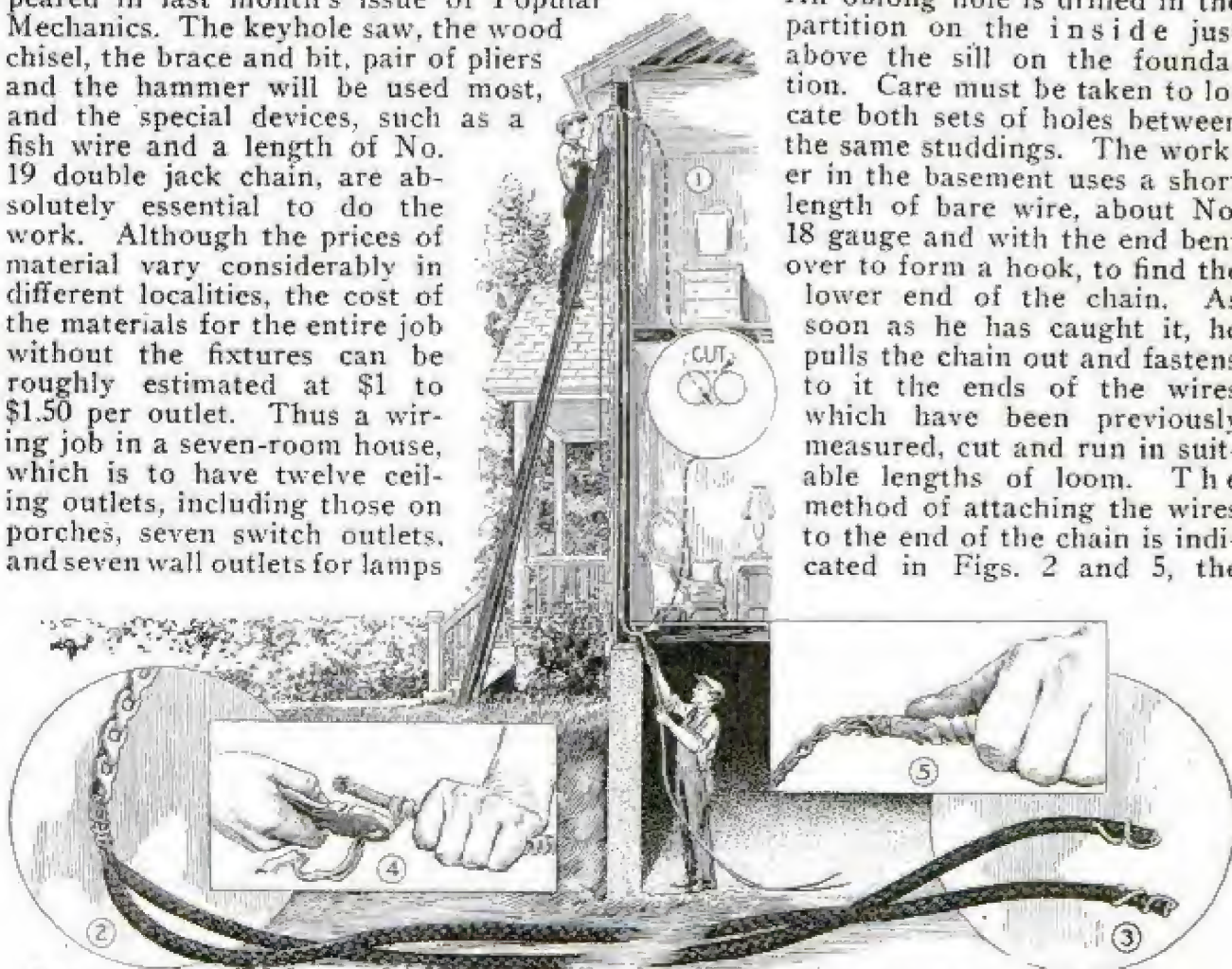
By E. R. Haan

THERE are hundreds of houses that were not wired for electricity when built, as it was not in general use at the time. To wire these houses is an easy task and can readily be done by anyone in his spare time. After the job is completed, there will scarcely be any evidence to show that it was done, provided the method described in this article is followed, and care is taken in doing the work. The tools ordinarily used by electricians for this kind of work have been described in the previous article, which appeared in last month's issue of *Popular Mechanics*. The keyhole saw, the wood chisel, the brace and bit, pair of pliers and the hammer will be used most, and the special devices, such as a fish wire and a length of No. 19 double jack chain, are absolutely essential to do the work. Although the prices of material vary considerably in different localities, the cost of the materials for the entire job without the fixtures can be roughly estimated at \$1 to \$1.50 per outlet. Thus a wiring job in a seven-room house, which is to have twelve ceiling outlets, including those on porches, seven switch outlets, and seven wall outlets for lamps

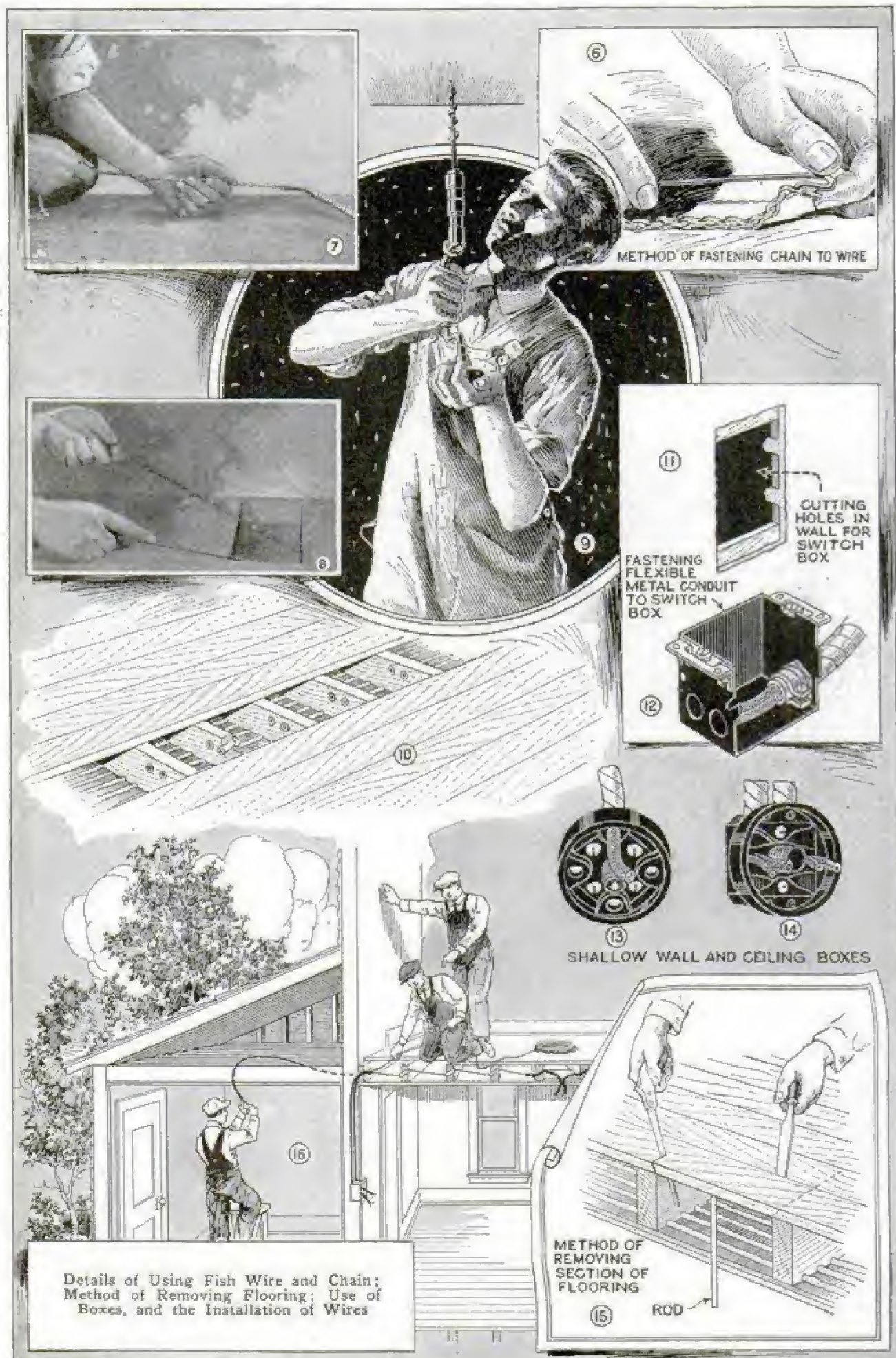
and electric appliances, will cost from \$26 to \$39 for material.

It will be found that two-wire, flexible metal conduit, such as BX, is most convenient to use for this kind of work. However, if it is not readily obtainable, you can use ordinary rubber-covered wire and loom. The first thing to do is to determine the most convenient location for the city supply or service lines, as shown in Fig. 1. A few feet below the eaves, two $\frac{5}{8}$ -in. holes are drilled close together, and the portion between them is chipped or sawed out to form an oblong hole as shown in the insert. A length of furnace chain, long enough to reach into the basement is dropped down into the partition.

An oblong hole is drilled in the partition on the inside just above the sill on the foundation. Care must be taken to locate both sets of holes between the same studs. The worker in the basement uses a short length of bare wire, about No. 18 gauge and with the end bent over to form a hook, to find the lower end of the chain. As soon as he has caught it, he pulls the chain out and fastens to it the ends of the wires which have been previously measured, cut and run in suitable lengths of loom. The method of attaching the wires to the end of the chain is indicated in Figs. 2 and 5, the



Beginning a Wiring Job on Finished House, Which Necessitates Wires to Be Fished through Partitions and under Floors; a Few Tricks Make the Task an Easy One



former showing the use of separate loom-covered wires and the latter showing the use of flexible metal conduit. You will notice that in both cases the wires are bared for an inch or two, and, after being threaded through the last link of the chain, the ends are twisted around so that they cannot come loose easily. In case BX is used, it will be necessary to untwist the metal covering a few inches, which can be done conveniently with a pair of pliers, as shown in Fig. 4. If two separate lengths of wire and loom are used, it will be necessary to bend over the free ends of the projecting wires and twist them around the loom as indicated in Fig. 3. This prevents the wire from being pulled out of the loom, if the latter meets some obstruction or binds in the partition in any way while the worker on the ladder is pulling the wires up. It will be found necessary to have a helper in doing most of this work, as someone must feed the wire into the partition from below while it is being pulled up with the chain from above. Use No. 10 or No. 12 rubber-covered wire for the service lines. In general, the method just described is followed when installing other wires in partitions. They are measured and cut below and are then pulled up with the chain, as shown in Fig. 7, connections to other wires being made later.

It may seem a trifle more difficult to the amateur to fish wires in horizontal runs between ceiling and floors but with the aid of a suitable length of No. 10 galvanized-iron wire, with the end bent as shown in Fig. 6, the task is an easy one. The installation of horizontal wires is illustrated in Fig. 16. An oblong hole is first drilled in the ceiling where the outlet is to be located, and a similar hole is drilled through the wall so that the wire and chain can be pushed through as shown in Fig. 8, until the chain is located above the outlet hole and the helper in the room below can fish for it as previously described. He then attaches the wires, and the worker on the second floor pulls them up. For concealed work, no wires are to be visible after the work is completed.

All the wires are strung between joists and studdings, under floors and in partitions. In some cases where it is necessary to run wires through a number of joists from one side of a room to the other, as shown in Fig. 10, a strip of flooring should be removed, if this is not too difficult to do. The keyhole saw is used as

shown in the headpiece to loosen the strip of flooring so that it can be removed more easily, which is done by means of a broad chisel. Obviously, care must be taken to

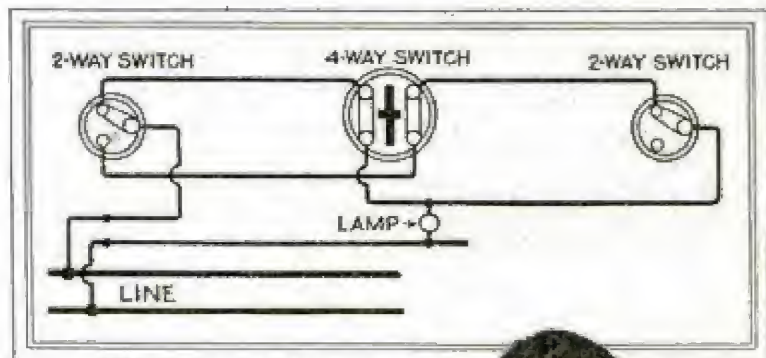


Fig. 17. Wiring a Lamp Circuit Controlled from Three Points

prevent splitting the edges of this strip and marring the floor. Most newer houses have double flooring, which complicates matters, and in such cases it is often advisable to drop the lines down the wall partitions, into the basement, and bring them up again on the other side of the series of joists that had to be crossed. In lightly built frame houses, it is often easier to take off the molding above the baseboard and run the wire under it. In such cases care should be taken to break off old nails, as any attempt to drive them out would cause a split in the board. In closets and around chimneys the installation of wires is easy. Holes are drilled through joists and tubes are pushed through, as explained in the previous article. In case wires can be run between the joists, only a small section of flooring has to be removed, as shown in Fig. 15, and when the board is replaced later a couple of short strips of 1-in. material are nailed to the joists as supports. A good method of locating the exact piece of flooring to be removed above the ceiling outlet, if it is necessary to get at the wires at this point, is to insert a rod in the ceiling outlet hole from below and tap it against the

Corrected diagram
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floor above, where the worker can readily determine just what floor board it is striking against.

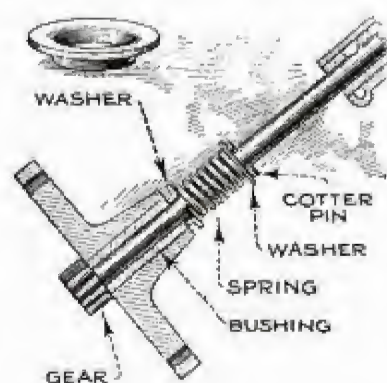
If flush switches are to be used, a hole is cut in the wall as shown in Fig. 11. A switch box is outlined on the wall. This is done so that the brackets on the edge of the box are directly over the lath and not over the spaces between the laths. The middle lath is sawed out and also part of the laths on each side, after the plaster has been removed, which requires great care. The best method of doing this is to cut into the plaster with a knife and then remove the plaster inside of the cut. Flexible metal conduit is fastened to the switch boxes with small clamps, as shown in Fig. 12, and if this conduit is used, shallow wall and ceiling boxes of the type shown in Figs. 13 and 14 should be installed. When wire and loom are used, it is only necessary to make an oblong hole between two plaster laths to permit the loom to be pulled through. There is very little knob work to be done on a job of this kind, and all wires which are not rig-

idly supported must be protected by loom. Flexible metal conduit is recommended because it is easier to work with and is also cheaper than wire and loom. It possesses great strength and comes in lengths from 50 to 200 feet.

In some cases it may be desired to control a light from three points and the wiring diagram shown in Fig. 17 is then followed. The importance of soldering all connections well after finishing the job cannot be overemphasized. Apply flux to wires after they have been well scraped with a knife, and then the solder. This treatment is necessary to insure a positive electrical connection, but in splicing it also serves to add mechanical strength. Unsoldered wires are dangerous, as they corrode from dampness, which increases the resistance at a joint, and this, in turn, allows the wires to become heated. All soldered joints should be covered with rubber tape while it is hot. When the rubber is hot it will adhere to the joint securely. Friction tape is then wound over the rubber.

Eliminating Steering-Gear Rattle

Finding that the straight split bushing at the lower end of the steering gear of my automobile (a model-91 Overland) did



not remain tightly against the gear, so that end play, accompanied by a disagreeable metallic rattle, occurred. I remedied the trouble in the following manner: A strong coil

spring was slipped over the steering rod and kept in compression against the lower bushing by means of a washer and cotter pin, as shown. The spring load should be approximately 25 lb. A washer, having a shoulder cut around it as shown in the upper left-hand detail, is inserted between the bushing and spring.—Carl N. Furay, Dayton, Ohio.

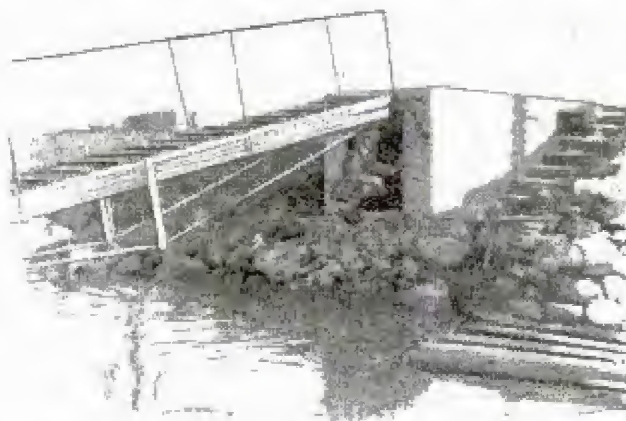
Softening Celluloid

Celluloid sheets, rods and tubes can be bent to any desired shape by first immersing them in hot water until the material is soft. After the article is bent to shape,

it can be hardened immediately by dipping in cold water. A convenient and strong celluloid cement is made by dissolving small pieces of it in equal parts of acetone. If a flexible celluloid paint is wanted, add a few drops of castor oil to the cement and color with alcohol-soluble aniline colors.

Locker under Motorboat Gangway

When a San Francisco motorboat owner was building a concrete landing for the gangway leading to the motorboat floats at the yacht harbor, he conceived



Convenient Locker under Concrete Landing for Motorboat Gangway

the idea of making the landing hollow, to provide a storeroom for buckets, hose, oil,

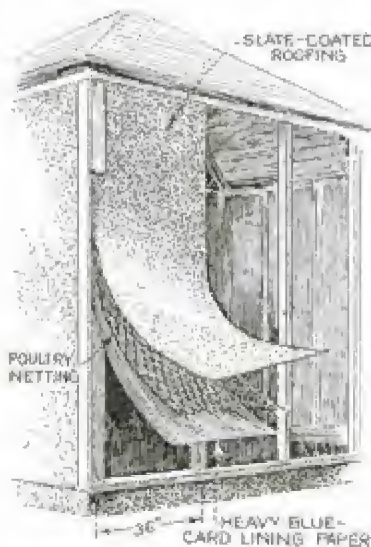
etc. In addition, the room was equipped with electric outlets so that wires could be extended to the motorboat for charging batteries and for use in electric heaters to keep the boat dry during the winter season, when it is not used very much. A connection with the local water supply was also installed.—C. W. Geiger, San Francisco, Calif.

Shelf for the Porch Swing

A shelf suspended under the seat of the porch swing is a handy addition to this useful piece of porch furniture, as it offers a convenient place to keep books, magazines and papers. The shelf should extend the entire length and width of the swing but it is suggested that it be not over 3 in. deep, as this will accommodate practically all the current reading matter one may have.

Erecting a Cheap Garage

A cheap and satisfactory garage can be built in the following way: The uprights or studdings are spaced 36 in. apart from



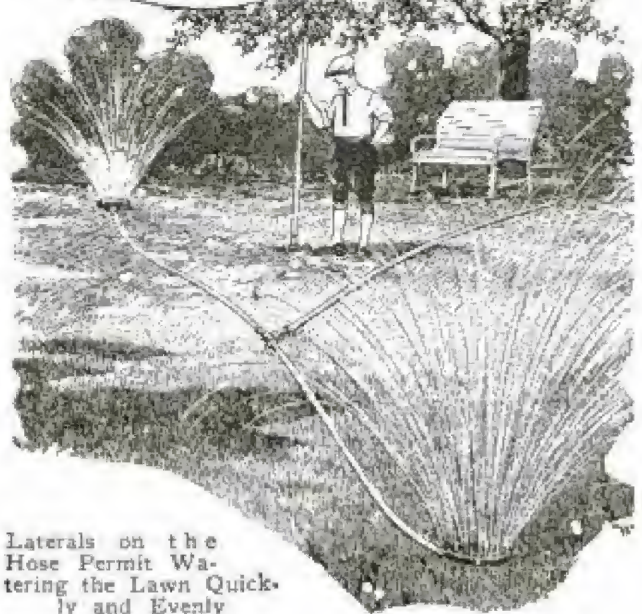
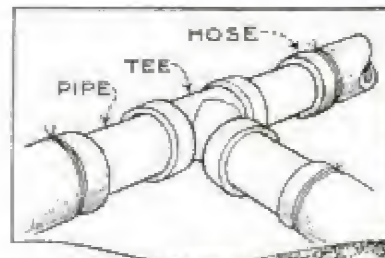
outside to outside and a strip of heavy blue-card lining paper, 36 in. wide, is tacked on. Then some 36-in. fine-mesh poultry netting is stapled on, and finally a strip of slate-coated roofing paper of the same width. The poultry net-

ting serves to add strength and rigidity to the walls and to protect the paper from being easily broken. The rafters should first be covered with a layer of sheathing, and then slate-coated or asphalt shingles are applied in the usual way. This construction is, of course, not as solid and durable as a wooden garage but it will last for many years.—H. T. Demarest, Warwick, N. Y.

☛ When shoestrings lose their metal ends, making lacing difficult, dip the tips in liquid celluloid, twist them hard and allow them to dry; this remedies the trouble.

Laterals for the Garden Hose

A home owner in San Antonio has run laterals from his hose and thereby doubles

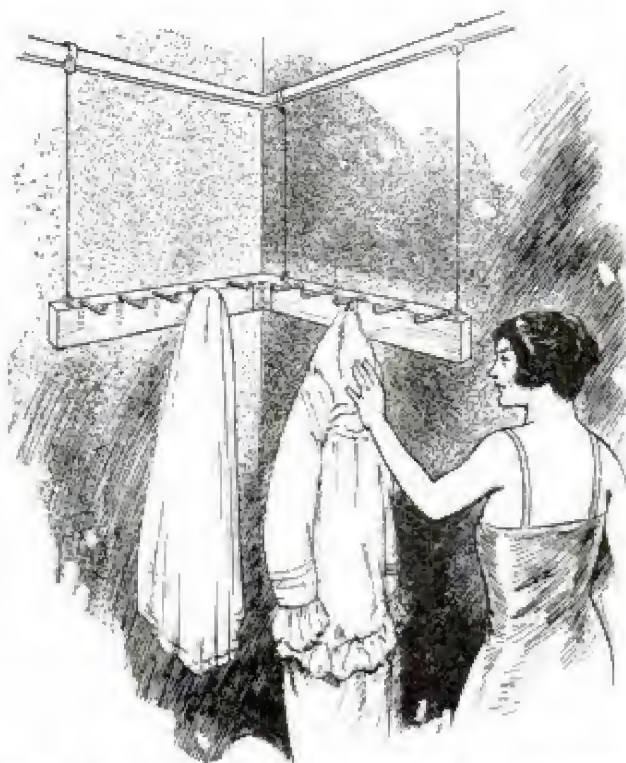


Laterals on the Hose Permit Watering the Lawn Quickly and Evenly

the area that can be watered at one time. The pressure is reduced somewhat, of course, but the results are more satisfactory as it is possible to adjust the distance between the sprinkler heads. The splice was made from a tee coupling, and three 5-in. pieces of pipe small enough to be forced into the hose. The laterals were cut from a hose which had begun to leak in places and are 12 ft. long. White lead should be placed on the pipe joints and rubber cement spread on the portions of the pipe which are inserted into the hose. It is good practice to make the joints tight with wire, even though the hose is stretched to fit over the pipe.—Dale R. Van Horn, Walton, Nebr.

Holding Suitcase in Tonneau

It is a good plan to attach a strap loop to the backside of the front seat in a touring car or a sedan, as this can be used conveniently to hold a suitcase or similar package against the seat back and keep it out of the passengers' way. Such a loop is also useful if a spare tire is to be carried in the tonneau.—E. T. Gunderson, Humboldt, Iowa.



Useful Clothes Rack for Small Apartments Where Space Is Limited

Folding Clothes Rack

In rented flats and small houses clothes-closet space is usually limited, and as the owners discourage the placing of additional hooks in other rooms, the illustrated collapsible rack will prove of considerable value. Its construction is such that it can be folded compactly for storage in a trunk or suitcase when not in use. Two 4-in. boards, about 2 ft. long, are hinged together as shown and holes are drilled in the upper edges to receive the hooks. Screweyes at the extreme ends of the rack and one near the hinge are provided, so that suitable lengths of picture wire can be tied on. The other ends of these wires are attached to the picture-molding hooks. When completed, the rack is opened and is suspended from the picture molding at one corner of the closet, the garment hooks being opened at right angles to the frame. When the frame is closed for storage, the hooks are turned parallel to the boards, or removed, so that little space is occupied. The hooks can be prevented from swinging to one side or the other when the rack is in place by cutting slots from each hole or socket, to the front edge of the board. This will allow the hook to drop down into the groove, and hold it securely at right angles.—G. E. Hendrickson, Argyle, Wis.

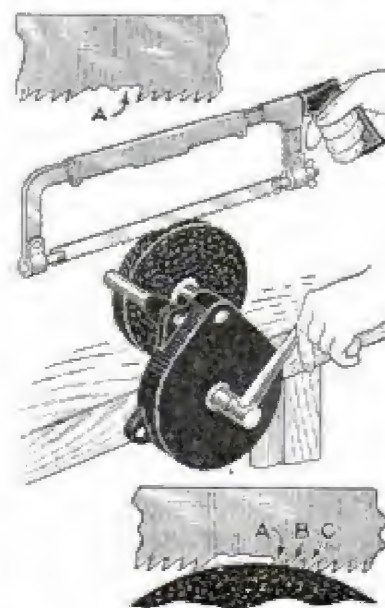
Small ornamented sandbags can be used on the piano for holding music that will not lie flat.

Inking Stamp Pads

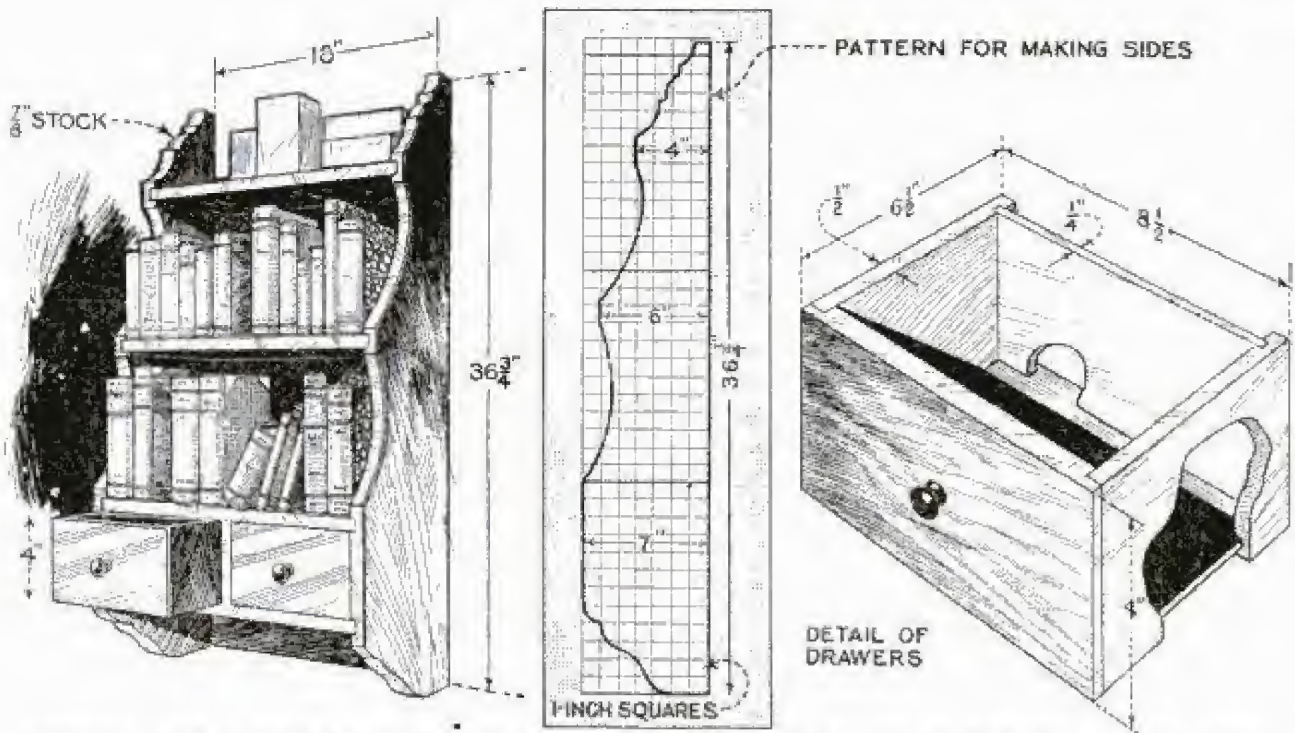
Almost anyone working in an office knows how unhandy it is for the office boy to ink pads on automatic rubber stamps. Besides the usual nuisance of smearing the fingers with ink, there is the hard part of getting it to apply itself to the brush in the bottle, especially when it gets a little lower than the brush will reach. This trouble may be avoided by putting the stamping ink into a small oilcan, which can be purchased at nearly any five and ten-cent store. Apply the spout to the stamp pad, pressing the bottom of the can gently and moving the spout across the pad, in order to spread the ink. After the ink has been applied, get a long pin and run it through a small piece of eraser rubber or cork; then put the point of the pin into the spout, and press the latter into the cork or rubber a short distance, preventing the ink from evaporating and spilling. Care should be taken not to select an oilcan which has too stiff a bottom. Press easily with the thumb, to determine this feature of the can. A stiff-bottomed can might cause the ink to gush out of the spout and over the side of the stamp pad.—J. R. Clough, Washington, District of Columbia.

Prolonging Life of Hacksaw Blades

When hacksaw blades are nicked they are usually thrown away as the rest of the teeth will follow suit, starting at the nick. This can, however, be prevented by grinding down some of the teeth adjacent to the nicked portion, as shown in the illustration. This is done by grinding down tooth A to about one-fourth, tooth B to about one-half and tooth C to about three-fourths of its normal size. When sawing, the tendency will be to raise the



blade out of the nicked part gradually and consequently allow the following teeth to be presented to the metal in a normal manner without any jar.



Assembled View of Colonial Book Shelf with Dimensions, Pattern for Cutting the Sides and Detail of Drawer Construction

Colonial Wall Shelves

The wall shelves shown typify the grace and charm of the early days, and have proved to be a useful bit of furniture. The names commonly associated with these shelves are "Mayflower," and "Colonial," and they are much in vogue at present.

From the standpoint of construction, the shelves do not offer any difficult joinery, and the ordinary tools of the home craftsman are sufficient. The curves may be cut with keyhole or turning saw, or, if neither of these is available, by making a number of cuts, using the crosscut saw, to within a sixteenth of an inch of the curved line. The curves can then be cut with a chisel, and smoothed with spokeshave and sandpaper. The stock list is not very large, and many varieties of wood are pleasing. Mahogany or black walnut are the woods most suitable, but soft woods finished with colored enamels would not be out of place.

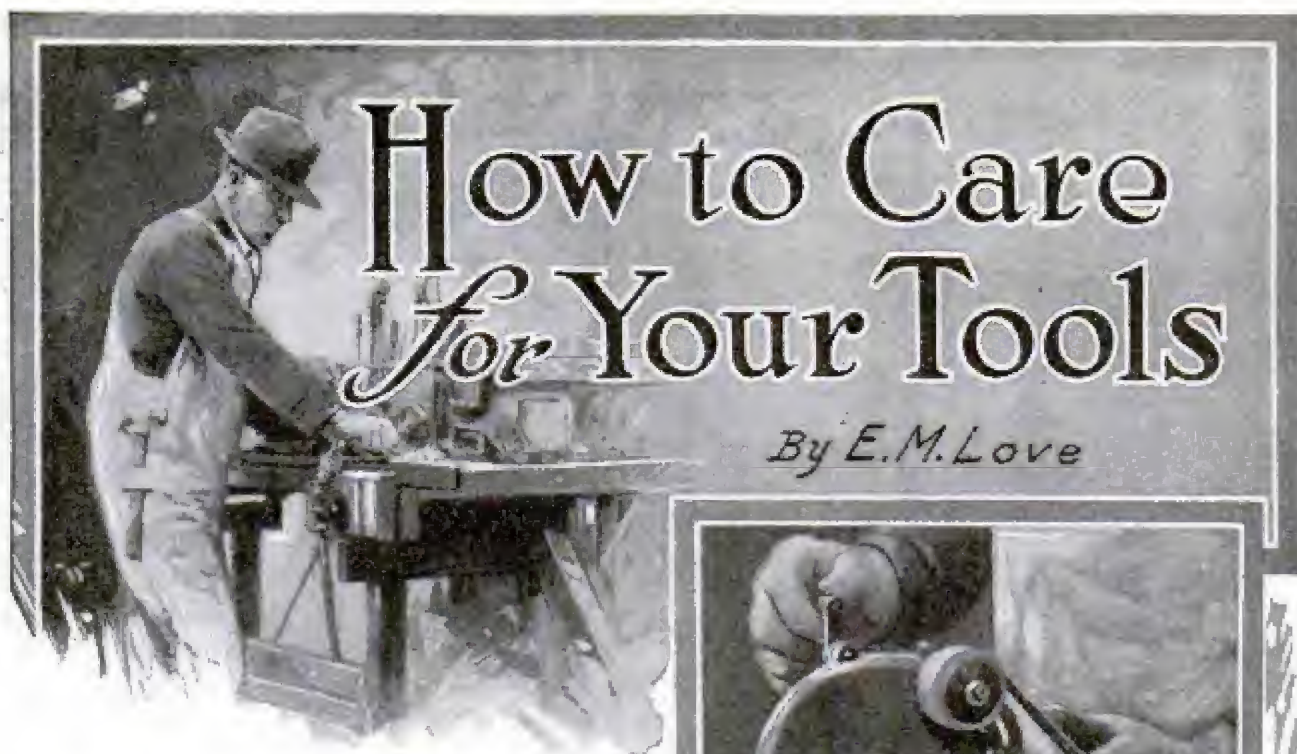
The shelves are set in dadoes in the sidepieces, then glued. The two drawers bring into play a knowledge of drawer construction and demand careful and accurate workmanship. Wooden pulls may be used on them, but a pair of antique brass or silver pulls would be most appropriate. The drawer is made about $\frac{1}{2}$ in. narrower than the depth of the side, and a $\frac{1}{2}$ -in. strip is nailed in place at the back of the lower shelf to prevent the drawer from going too far back. The shelves are shown without a back, although they were not always so constructed. Three-ply

panel stock of a suitable wood makes the best type of back. If a back is to be used, its thickness should be subtracted from the width of the shelves and the sidepieces should be rabbeted for it. The top of the back should be curved in some harmonious line. However, a back is not at all necessary. Many methods of fastening the shelves to the wall will suggest themselves, and the method chosen will have to be governed in part by the type of wall. The shelves may be fastened to the ordinary lath and plaster wall by means of patented fasteners obtainable at any hardware store.—K. R. LaVoy, Syracuse, New York.

Making the Umbrella Stay Up

Umbrellas sometimes fold up suddenly in a downpour, causing annoyance and discomfort. This usually happens because the upper catch in the stem does not hold the top up securely. This catch is rounded at the projecting corner and if its spring is not very strong it will be pushed in by a slight pressure on top. However, if the upper part of the catch is filed down as shown in the drawing, it is impossible for the sleeve holding the ribs and top to slip over it, and the trouble from this cause will not occur again.—A. Dunbar, Housatonic, Mass.





How to Care for Your Tools

By E.M. Love

ASIDE from a mechanic's skill, nothing contributes more to his accuracy and speed than the keenness of his tools. Skilled workmen keep sharp cutting edges as a matter of course; but many amateurs foolishly postpone sharpening until their tools are woefully dull and out of adjustment.

To care for a plane intelligently, the use of each part should be understood. The body is known as the stock, and the opening through which the plane iron passes is the throat. The frog is the sloping table which carries the plane iron. The cap, a secondary blade above the plane iron, is held to it by a large-headed screw, and this assembly is secured to the frog by the heavy wedge or clamp. The body, in addition to supporting the cutting assembly, acts as a depth gauge for the cut and a straightedge for directing it. Theoretically, therefore, the narrower the throat, the more support and guidance given the cutting edge, and the better the resulting work. This adjustment, however, is not nearly as important as some others, and the amateur may safely let it alone, although, for fine work, it often is an advantage to narrow the throat. This is done by removing the plane iron, loosening the two capscrews in the base of the frog, and moving the latter forward by turning the setscrew at the back. The capscrews must again be tightened after adjustment, for looseness here is sure to cause chattering on any but the very lightest cuts.

If in perfect condition, the edge of the cap fits tightly against the plane iron. Reinforced by pressure from the clamp, it bends back the shavings, giving better



clearance, and, by breaking the shaving, prevents it from splitting ahead into the wood. When set down very close to the edge of the plane iron, thin shavings can be cut against the grain as smoothly as with it, provided the adjustment is perfect. Unfortunately, it seldom is. Sometimes the edge of the cap, being blunted, rises nearly at right angles to the surface of the plane iron; or the shape of the end may prevent the edge from making contact with the plane iron. Shavings drive into the wedge-shaped opening thus formed, choking the throat. This is a very common fault, and even the most careful sharpening of the cap will not always overcome it. The edge may make good con-



tact when out of the plane, only to be forced open by the pressure of the wedge when clamped on the frog; or wear may twist it open at some point. As a matter of fact, common planes will not ordinarily cut well against the grain, and mechanics generally resort to the scraper for cross-grained woods. The amateur, therefore, if he wishes to do good work, should not fail to learn the handling of a scraper.

If anyone buys a plane, with the idea of doing first-class work, intending to keep the tool in adjustment, he cannot do better than to purchase a good self-setting

plane, such as the Gage, in which the cap is combined with the clamp, and can be set rigidly against the plane iron with as little clearance as .01 in., enabling the tool to cut smoothly the most crossgrained wood. Although it is easy to keep in shape when once conditioned, it is entirely unfitted for careless handling.

Sometimes the amateur mechanic is puzzled by a plane iron which is sharp enough to shave the hair from the back of his hand, yet will not turn up a shaving when put in the plane. This happens when the edge is dubbed off, so that the wood makes contact on the bevel behind the edge, instead of with the edge itself.

When grinding is needed, grind. It is a waste of time to remove any considerable amount of stock by whetting on an oil-stone. If possible, when using either the grindstone or emery wheel, brace the end of the plane iron or chisel against some support. In any case, hold the blade rigidly and brace the arm against the body, as shown in Fig. 1. Take a position that will give plenty of bevel, and, applying light pressure, move the blade evenly from side to side until the grinding is done. The hollow in the bevel is really an asset; and when the blade has been whetted until the hollow disappears, the bit needs regrinding. With hand-operated grinders there is little danger of drawing the temper of the tool, but care must be taken to keep the edge square, avoid wearing away the corners, and to stop the instant the wire edge appears.

Whet the blade at the angle of grinding (Fig. 2). Rarely is it worth while to use a double bevel. Do not rock the blade, but make a long stroke with a rotary motion, honing until the wire edge turns up. If the bit being sharpened is a jackplane iron, to be used much on rough stock, crown the edge about $\frac{1}{16}$ in., but if it is to be used on milled stock, keep the edge about straight, relieving the corners to prevent their digging into the wood. This latter method applies as well to jointer, smoother, and blockplanes. Lay the blade flat



work, and considerably less than $\frac{1}{16}$ in. for fine work. With a smoothing plane, keep it as close down as is consistent with free action. Fig. 7 shows how the throat width is adjusted.

While some men sight alone the sole of the plane in adjusting the bit for depth of cut, a more convenient method is to rub the edge lightly with the thumb or finger (Fig. 8). Generally the sense of touch is more accurate than that of sight, and there is little danger of cutting the skin. Having obtained a keen edge, keep it as long as possible. Dust off the wood before surfacing it, and use the smoother only on clean stock.

Never use sandpaper before all work with edged tools is complete, since bits of glass remain in the wood and quickly dull any cutter. Remember that the return stroke of a plane wears the bit almost as much as a cutting stroke, so that the life of the cutting edge can nearly be doubled by lifting the tool on the return. When laying it aside,

turn it on its side, or better, rest the toe on a cleat provided for the purpose. Squareness of the bit and accuracy of corners are essentials for rabbet or combination planes.

It is surprisingly

on the stone (Fig. 3) to remove the wire edge, for any bevel on the upper side is ruinous. Stropping on a strip of leather improves the edge, or, if the hands are fairly clean, the bit can be stropped on the palm, as in Fig. 4.

In spite of the fact that spermoil is recommended for use on oilstones, many practical mechanics use water or kerosene with excellent results. The liquid is used less for cooling the edge than to prevent clogging of the stone and to increase the cutting speed. Hone as much at the ends of the stone as at the center, and it will wear down fairly evenly, although it is nearly impossible to prevent uneven wear altogether. A worn stone can be straightened by being rubbed on a pavement or on emery cloth laid on a flat surface (see Fig. 5).

In assembling the plane iron with its cap, as in Fig. 6, keep the edge back from $\frac{1}{16}$ to $\frac{1}{8}$ in. from the cutting edge of the bit for rough



difficult to learn to sharpen a scraper, but once skill is acquired, an edge can be made very quickly. For general work, many mechanics prefer the beveled edge, which cuts a little faster than the square edge. File a bevel similar to that on a plane iron, and hone it to razor sharpness. Then lubricate the edge with wax, and draw a waxed burnisher or nailset firmly along it, turning the burr toward the flat side. This is shown in Fig. 10. Give two or three more strokes, inclining the burnisher still more until the burr is nearly at right angles to the blade. It should then turn up a shaving nearly as heavy as that made by a plane (Fig. 11). Hold the scraper firmly, inclining it in the direction of motion.

If it does not cut, vary the angle. When dull, lay the scraper flat on the bench and turn the burr back straight. Then turn it as at first, and more than likely it will cut better than before. If the blade has good material in it, it can be thus resharpened several times before the burr breaks off, or is hopelessly dulled, necessitating filing and whetting. In some cases, when the burr has dulled and is in danger of stripping off if turned again, it may be honed on an oilstone by inclining the blade in the cutting direction. For scraping ve-



neers, and for very fine smoothing, a square edge is best, and it has the advantage of permitting all edges to be sharpened without danger of cutting the user's hands. File the edges straight and square, and whet them, as in Fig. 9, until file marks are gone and the corners are keen. Then burr the corners toward the faces, as with the beveled scraper. If the blade is used in a handle or plane, be careful not to turn the burr over so far that it cannot touch the wood. An easy way to adjust for depth is to set the plane on a board, with the blade loose in the clamp, and the edge resting on the wood. Tighten the clamp, turn up the flexing screw, and the adjustment is correct.



A chisel is sharpened in much the same manner as a plane iron. When doing mortising, a very acute angle on the cutting edge can be used to advantage if the tool is carefully applied. Strike the handle squarely with the mallet, or the side of the hammer head (which carpenters use,

casional reshaping. The sides should be made parallel, since the slightest taper gives the driver a tendency



rather than carry a mallet), as shown in Fig. 12, and in removing chips, pry against the bevel, thus distributing the pressure over a large area, instead of localizing it on the thin edge.

The most convenient method of sharpening a gouge is to hold it firmly in the left hand while whetting with a stone held in the right, Figs. 13 and 14. There is less likelihood of dubbing off the edge than if the stone is rested on the bench, and a more even pressure can be maintained. Use a circular stroke with the stone, working it evenly from one corner to the other of the tool, until a keen edge is produced. Rub off the wire edge with the corner of the stone slid on the concave side, or better, with the round edge of a slip stone. If the bevel is inside, a round-edged stone must be used with fairly straight up and down strokes.

Sharpen the blade of a spokeshave like a plane bit, and whet a drawing knife with the stone held in the hand, carefully avoiding dubbing the edge or wearing irregularities in it.

When sharpening an auger bit, file on the upper side of each lip, Fig. 15, removing a minimum of stock, and in touching up the spurs, Fig. 16, file on the inside. Avoid cutting into the threads of the point.

Drill points are best sharpened on the grinder. Hold them at an angle of about 30° with the wheel, and somewhat inclined downward. Begin grinding at the edge, and, without altering the angle, rotate the point to obtain clearance.

While screwdrivers are not cutting tools, their points wear and bend, and need oc-

casional reshaping. The sides should be made parallel, since the slightest taper gives the driver a tendency

to climb out of the slot, requiring pressure to keep it in, and increasing the chances of breaking the screw. Were it not for weakening the tool it would be well to slope the sides inward from the point.

The cupped point of a nail punch, when battered beyond usefulness, may be renewed by hammering the tip as in Fig. 17, using a handax head as an anvil. The hammer is a cutting tool, in the sense that the sharp edge of the claws must cut into the sides of the nails to be drawn. When a nail head pulls off, it is often possible, by tapping the hammer face, to force the claws into the nail enough to pull it; but the claws are tempered hard enough to cut the nail, and such forcing may chip the edge or even break off a claw. It is common enough abuse of a hammer, and on rare occasions may be justifiable; but no surprise should be felt if the tool breaks. (See Fig. 18.)

Driving Nails under Shingles

When repairing a roof, either by nailing down the loose shingles, or by inserting new ones, the workman is obliged to leave



many of the nails exposed to the weather. All their heads soon become sources of leaks as they are drawn out by contraction and expansion due to changes in temperature.

The method shown in the drawing allows all nails to be driven under the shingles so that they will not be exposed. A strip of $\frac{1}{16}$ -in. steel, about 1 in. wide, is bent to a U-shape and slipped on the end of the shingle over the one being nailed down. The upper shingle is raised to insert the nail, which can then be driven down.—Dexter W. Allis, Everett, Mass.

Cheap Condensing Lens for Enlarger

A good condensing lens costs a great deal, its price being proportionate to its size. As all of us are not fortunate enough to possess the manufactured article, a lens that costs very little and can be depended upon to do good work would probably be welcome. The lens is a large-size reading glass placed in front of the bulb at the proper distance. A little experimenting will be necessary before the right illumination is secured. A lens properly placed will cover a 5 by 7-in. negative with even brilliancy.

Safety Stop on Razor Strop



Unless care is exercised when stropping the type of safety razor shown, the blade may be damaged by hitting it against the metal end-piece of the strop when the return stroke is started. This risk can be

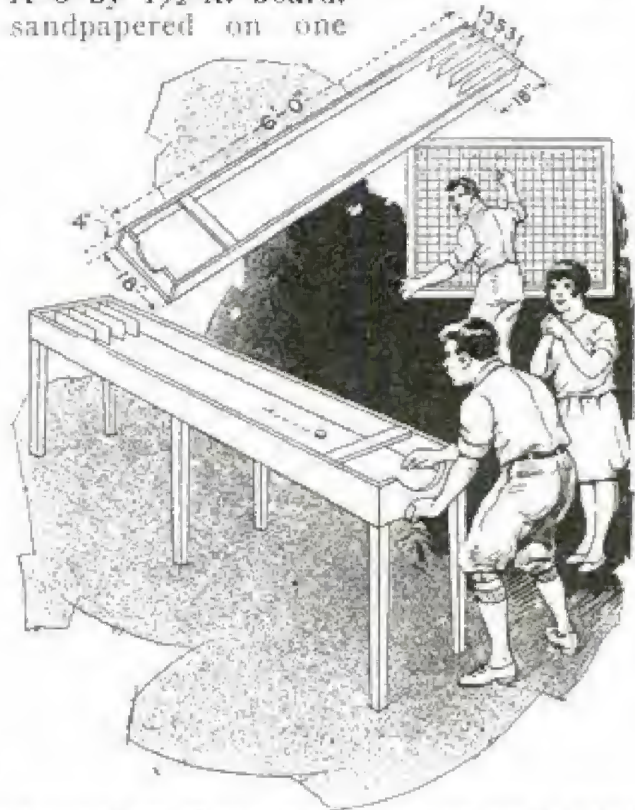
eliminated by gluing a small piece of leather to the strop, about 2 in. from the end, and thus stop the razor before the danger point is reached.—Harold Nowell Whitmore, Cleveland, Ohio.

Making Liquid Glue

Liquid glue can be made by dissolving chloral hydrate; water and gelatin. From 20 to 35 grains of chloral hydrate is added to each ounce of water, and this solution is used to dissolve the gelatin. Liquid glue thus made will keep for months without spoiling. It has the property of drying quickly and has great adhesion.—William B. Stone, San Jose, Calif.

Homemade Shuffleboard

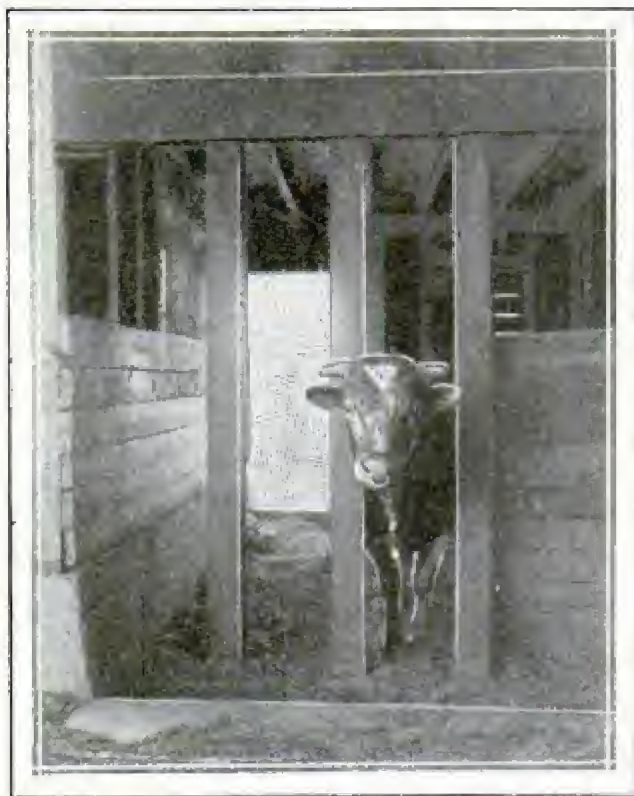
A shuffleboard similar in principle to that used so commonly on shipboard can be made for home use with little trouble. A 6 by $1\frac{1}{2}$ -ft. board, sandpapered on one



Homemade Shuffleboard for Interesting Game in Which Both Skill and Chance Enter

side, serves as a base. The sides and ends are closed with 4-in. strips, the front strip being cut out as shown for convenience in driving the disks. About $1\frac{1}{2}$ ft. from the front end a 2 by $\frac{1}{2}$ -in. strip is placed across the two sides. Beneath this strip the "pucks" or 2-in. disks are pushed. Thus, there will be $1\frac{1}{2}$ ft. of slide before the disk leaves the hand. At the other end of the board there are four partitions, making five divisions into which the pucks are slid. The two outer ones count one point; the next two, three; and the center one counts five. An even number of the round disks is used and any number from 6 to 12 will suffice. The players may flip a coin for the first shot, and the game goes on, each "shuffling" alternately, until the supply of disks is exhausted. Then the score is counted. Fifty points is a game, but any player going over that score will have to start at the beginning again. In this and in the difficulty of making the three and five-point shots lies the fascination of the game.

☛ For keeping the windshield clear a good solution is made by mixing 2 oz. of glycerin and 1 tablespoonful of salt in 1 oz. of water. Apply with a piece of cloth.



Posts Spaced Sixteen Inches Apart Bar Bull but Permit Attendant to Pass

Safety-First Bull Pen

On the Guernsey farm near Lebanon, Ind., it has been found advisable to provide wooden posts around the bull pen, as shown in the photo. The space between the posts is 16 in., which permits the bull to get his head through to eat out of a trough and also gives the attendant an opportunity to slip out of the pen if the bull becomes unruly.—J. C. Allen, West Lafayette, Ind.

How to Reduce Your Gas Bill

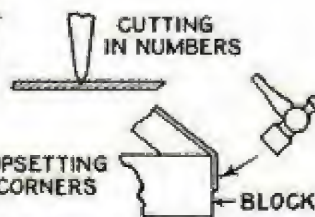
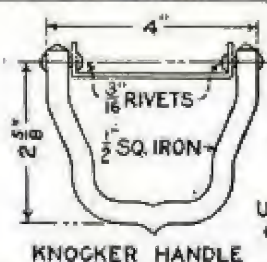
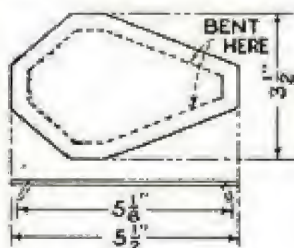
Wasted gas performs no useful work but nevertheless must be paid for. To prevent waste a few simple rules should be followed. Use only a low, blue flame, and keep the burners and oven clean. The top lighter should always be lit before the other burners are turned on. Where pilot lights are provided on ranges, be sure that they are adjusted correctly so that the least amount of gas is

consumed. Water boils at 212° F., and no matter how high the gas is turned up, you cannot heat water beyond this temperature, so keep the flame turned down as far as possible after the water is boiling. By using pans that cover the entire burner, the flame will not creep up over the sides. This does not add much heat to the contents of the pan, but means a loss. Be sure to save heat in the utensils by keeping them covered. When not using the gas for a few moments, turn it off. Matches are cheaper than gas. When baking, take into consideration that it costs just as much to heat the oven for preparing one dish as it does if you had the whole of it filled.

Antique Door Knockers

Aside from its decorative value, the door knocker shown in the illustration has utility, and as it is practically indestructible it will not need the attention of a doorbell. It is made of wrought iron, and is just as pleasing and effective as a highly polished brass knocker. Black iron offsets nicely against a white background. The house furnace will serve as a forge, and if no anvil is available, a block of iron or a section of steel rail can be used for hammering out the shapes. A bar of $\frac{3}{8}$ -in. square iron rod, about 8 in. long, makes the knocker handle. A piece of $\frac{3}{16}$ -in. iron plate, $3\frac{1}{2}$ by $5\frac{1}{2}$ in., is used to make the body of the knocker. The pattern for the body is cut out with a cold chisel, the plate

being held in a vise. The house number is cut into the surface by means of a sharp cold chisel. The plate is heated to a dull red and the front surface is planished with a hammer. The plate is then reheated and the edges are turned back in the vise as shown in the detail. The hinge pins are rivets fitted loosely and put in after the drilling is finished. The heads of the nails used for fastening the knocker should be square, to resemble the style of nails in use years



Homemade Iron Door Knocker in Antique Style Embellishes Door Panels

ago when knockers were generally used.—G. A. Luers, Washington, D. C.



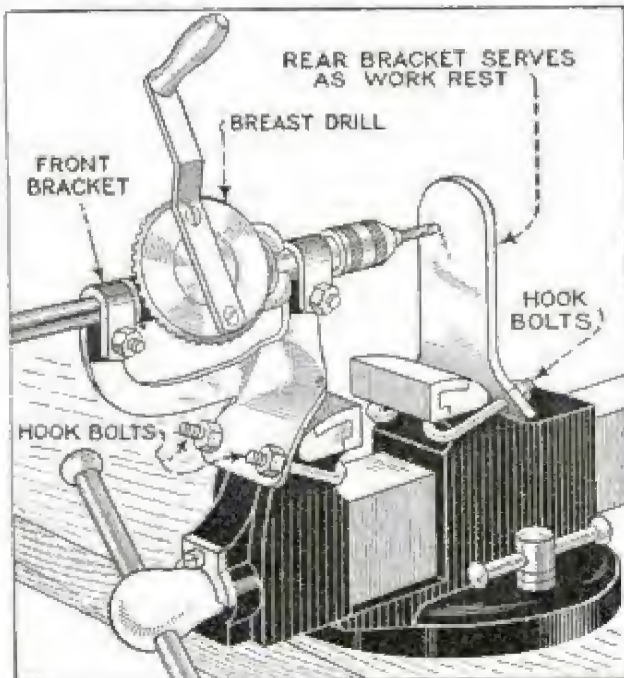
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Attachment Fits Breast Drill to Vise

By G. A. LUERS

THERE are many occasions, in the small shop or garage that has no drill press, when the mechanic wishes for some easier method of drilling a small hole than that of pushing it through with a breast drill. Even if a drill press is available, occasionally a part is encountered of such a shape that it is more convenient to drill a hole with the breast drill than to spend the time in blocking and clamping the work to the drill-press table. In such

steel, cut to the shape shown in the detail drawing and bent to fit against the back of the rear jaw, to which it is held by means of two hook bolts. These permit the plate to be attached and detached quickly. The bracket for the drill is also of $\frac{3}{8}$ -in. plate, the lower end being cut and formed to fit the front jaw, in a similar manner to the rear plate, and fitted with two hook bolts also. The upper end is cut to form two clamps that will grasp the drill, one clamp just behind the chuck and the other on the handle rod just behind the top of the cast-iron frame. The bracket is then twisted as shown, and holes are drilled for the clamping bolts. This construction allows the drill to be removed for use in the regular manner when desired. It is desirable to face the rear plate with a block of hardwood, fastening this to the plate by means of wood screws driven in from the back, at the corners, so



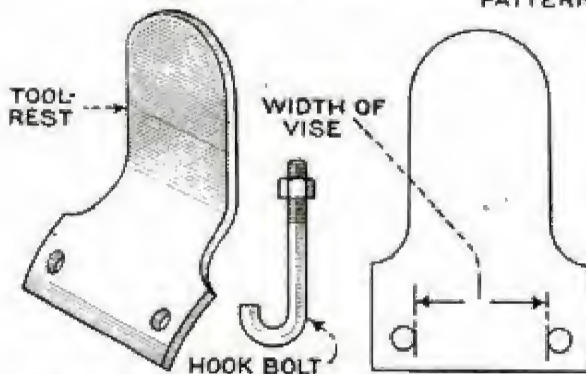
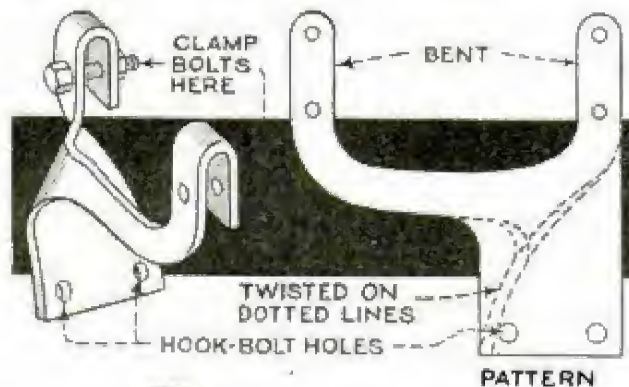
A Simple Attachment That Converts the Breast Drill into a Drill Press with a Positive Feed

cases the attachment shown in the illustrations will appeal to the mechanic. With this, the part to be drilled is held against a rest, while the drill, held in a bracket fastened to the movable jaw of the vise, is fed against the work by means of the screw. The advantage of this is apparent. The breast drill, being held rigidly, makes a truer hole with much less labor than when held in the usual way.

The rear plate, against which the work is held, is simply a piece of $\frac{3}{8}$ -in. plate



that they will not be near the drill point; the block can thus be renewed when too many spots are drilled in it. A loose



Details of the Brackets and the Hook Bolts for Attaching Them to the Vise

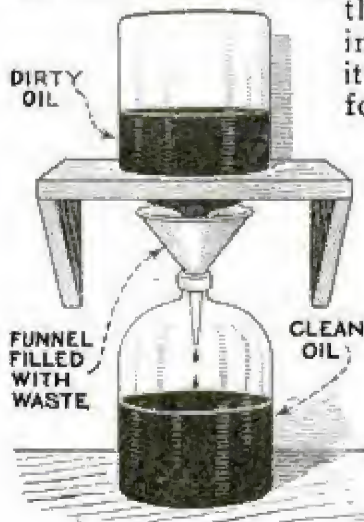
block may, of course, be used if desired, but fastening the block to the plate makes the operation of the attachment more convenient. Work can be held against the rear plate by means of large C-clamps, thus leaving the hands free for turning and feeding the drill.

Simple Outfit Filters Used Oil

Anybody can make the simple oil filter shown in the drawing. It consists of two large bottles, a funnel and some waste. Put the dirty oil in one of the bottles, place the waste in the funnel and insert the latter into one bottle as indicated. Invert

the bottle containing the oil, placing it on a shelf or platform to hold it securely. As soon as the oil has filtered through into the lower bottle, the bottles may be reversed if it is desired to re-filter the oil. It is a simple matter to re-

new the waste,



and as the bottles are made of glass, the condition of the oil can readily be seen at all times.—W. F. Schaphorst, Newark, New Jersey.

Cleaning Enamel

To clean enamel, wipe it off with a moist cloth dipped in precipitated chalk and rub gently. Soft flannel is best, and Paris white, which is a very fine grade of whiting, will do. First dip the flannel in hot water and wring it out as dry as possible; then dip it in the whiting. Wash off with clear lukewarm water, and rub dry with a soft chamois skin or flannel cloth.—A. A. Kelly, Malvern, Pa.

Hip Holster for Auto Service-Station Attendant

Here is a holster that is of real service to one who attends cars at filling stations or garages all day long. Made from light, pliable leather, it holds a tire-pressure gauge, a small screwdriver and a pair of pliers. The leather costs about 60 cents and the stitching can be done on a sewing machine. The best way to make the holster is to mark out the size and location of the tools on a piece of paper. Then trim down to the smallest practicable space, and cut out the leather, allowing $\frac{1}{4}$ in. for the seams on all sides. One of the leather pieces has two strips extending from it at the upper corner. This piece goes next to the body and the ends of the strips are riveted down to form loops for a belt. —Dale R. Van Horn, Walton, Nebr.



Testing Soundness of Posts

A coal trestle was being replaced, which was very old and had a large number of posts badly decayed close to the ground. An external examination of the caps seemed to indicate that it would be necessary to replace all of them. To make an internal inspection meant that a $\frac{3}{8}$ -in. hole had to be drilled through them in several places. However, the following kink was

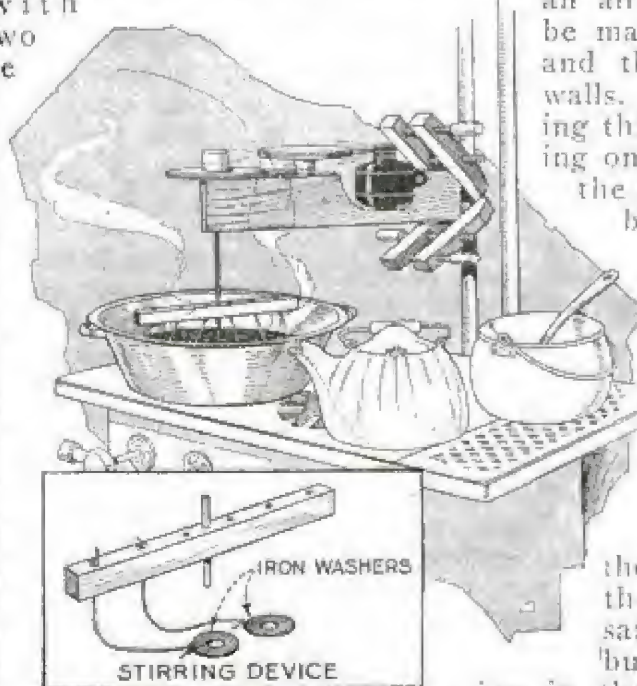
used and proved to be as reliable as the physical inspection. An ordinary watch was held tightly against one end of a cap. The inspector placed his ear at the opposite end against the butt of the cap. If the tick of the watch could be heard through the wood, the cap was sound. If not, there was a rotten heart, or the inside was decayed sufficiently to necessitate replacement. The operation was reversed as a check. In every case examination of the timber when removed proved the accuracy of the method.—H. M. Toombs, Chicago, Ill.

Use for Old Hypo

When hypo solution can no longer be used for fixing, it will do for cleaning developing trays of the dark precipitation that forms after long usage. Fill the trays with the hypo solution and leave them stand overnight. In the morning wash the trays with hot water and soap to remove all the hypo before using them again for developing.—Edward H. Flaharty, Denver, Colo.

Motor-Driven Stirring Device

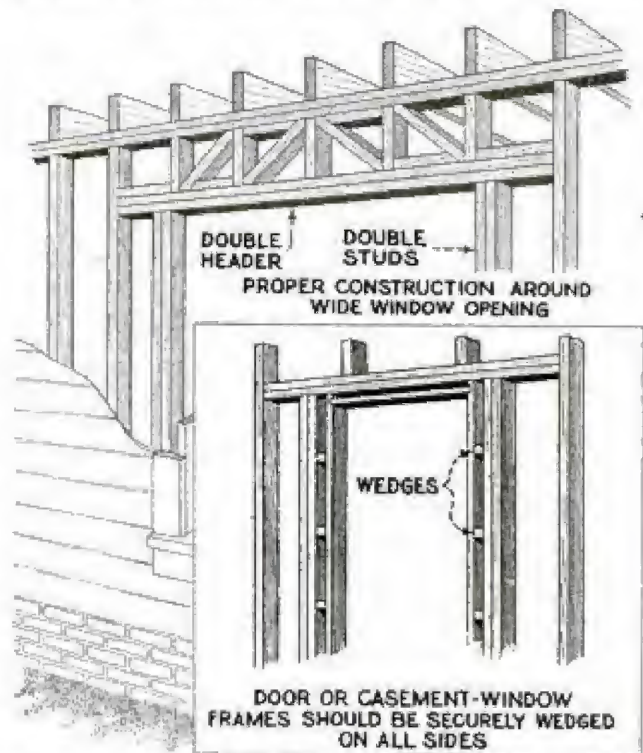
Stirring sauce such as catsup, which requires considerable cooking before it is canned, is tiresome to do by hand, and the motor-driven stirring device shown in the drawing will be found convenient. It consists of a 1 by 4 by 30-in. board to which an electric-fan motor, a couple of pulleys, and a stirring arm are attached. The fan is unscrewed from the motor and a small V-grooved pulley is substituted. This in turn is connected with rubber bands to the two pulleys to reduce the speed of the arm to about 60 r.p.m. The pulleys may be turned on a small lathe. The stirring arm has five holes drilled in it, as indicated. Five heavy washers are tied to lengths of strong cord, which are slipped through the holes in the arm, as shown, and knotted. The strings should be just long enough to let the washers drag on the bottom of the pan.—William L. Hunter, Iowa City, Iowa.



Novel Sauce-Stirring Device Run by Means of Small Electric Motor

Construction of Window Frames

Satisfactory service from frames and windows depends first of all on proper



Proper Installation of Door and Window Frames Excludes Drafts

construction around the window opening. A double header should always be used. If more than two studs are cut away the space over the windows should be "bridged." This simply means the provision of braces to distribute the weight from the center to the supporting studs at the sides. Door and window frames should be securely wedged on all sides and

an air-tight junction should be made between the frame and the inside and outside walls. A good method of doing this is to set a false casing on the outside flush with the sheathing. Tack tarred building paper over the false casing and extend it over the sheathing. Then place the outside finished casing over the paper. Rabbet the lower surface of the window sill on the outside edge to admit the siding, and the inner edge to anchor the plaster. It is necessary to use a non-combustible material for fill in the opening underneath

ing in the sill.

Wire Netting Protects Magazines

The display rack shown in the photo, in which magazines are protected against being stolen and handled, is used by a



Wire Mesh over Magazine Rack Prevents Handling and Stealing

newsdealer in Cincinnati. A wire strung in the middle of each rack keeps the magazines in place and preserves the covers.—L. R. Tichenor, Cincinnati, Ohio.

Improving Auto Valves

Leaky auto valves can be improved by cutting a $\frac{1}{8}$ -in. groove in the head at the same angle as the valve face and about $\frac{1}{16}$ in. from the edge. This leaves a thin shell, which is flexible and improves the



seating of the valve, especially when the engine is hot. The force of the explosion tends to make the seating a tighter fit, and after the valve has been fitted, the surface takes on a very high polish. The hammering effect so noticeable in solid valves is entirely absent in this improved valve. When newly made, the seating surface of the valve is faced off at the same

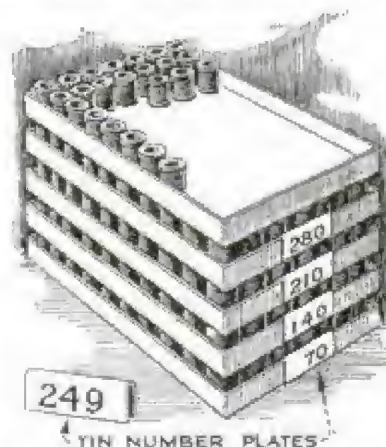
time as the slot and all valves are carefully ground in. More clearance must be allowed at the lower end of the stem than

usual. The slotting is done on the lathe, working with centers, as the slot must be concentric with the seating, and the walls must be the same thickness all the way down. The bottom of the slot should be rounded, which is easily done by using a round-nose tool.—Arthur N. Capron, Athelstan, Can.

Keeping Perpetual Inventory

Where a large stock of material is usually kept on hand, such as capscrews, small brass and iron castings, machine bolts, belt hooks, drills, etc., it will be found advantageous to keep the material in tin trays, as shown in the illustration. This also makes it easy to take inventory of the stock. The main features of this arrangement are the neatness, compactness and the possibility of counting the contents without touching a single item. A number of trays of suitable sizes are made of No. 16 gauge galvanized iron, the sides being formed by turning up the four edges $\frac{1}{2}$ or 1 in. No fastening or soldering at the corners is needed. A number of tin tabs are cut out and folded over as shown in the insert; these are slipped over the front edge of the trays and the number of items in the tray is marked on them. The

tabs are put on by the stock boy when he loads up the trays from the original containers before putting them on the shelf in the racks. If there is a duplicate supply of items in another part of the stock-room or warehouse, a red tab is fastened to the bottom tray of the tier. This informs the stock keeper that there is a reserve stock to be inventoried also.—E. E. Moffat, Pasadena, Calif.



Cutting and Bending Small Tubing

If thin metal tubing is filled with melted tallow and the tallow then allowed to cool and harden, the tubing can be held fairly tight in a vise without much danger of flattening it, and can be cut into $\frac{1}{4}$ -in. lengths, if desired, without spoiling the

diameter. The tallow can be removed by allowing hot water to run over the tubing until the tallow melts and runs out, or by placing it in some location where the temperature is sufficiently high to melt the

Preventing Scour on River Bank

A western city protects its river banks from scour during flood periods by paving the slopes with old stone curbing, which

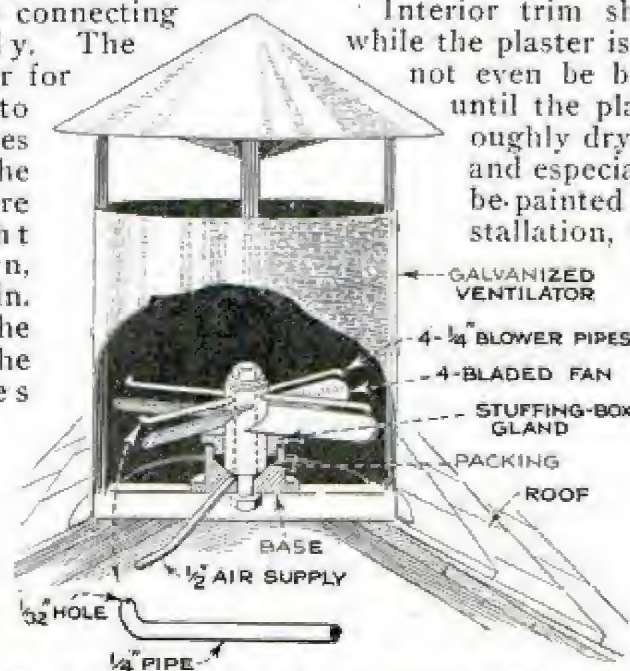


Flood Banks of Western River Protected Effectively against Scour by Paving with Curbstones That Were Too Worn to Be Used in Street-Improvement Work

tallow. Often very thin metal tubes can be cut by using the back instead of the teeth of the hacksaw.

Exhaust Fan Driven by Compressed Air

The illustration shows a ventilating fan operated by compressed air. This arrangement is used to exhaust air from a room or small building where it would be uneconomical to have a motor idle most of the time. Four $\frac{1}{4}$ -in. blower pipes are screwed into a cast-iron hub, which has four holes connecting with the air supply. The base acts as a receiver for the air and allows it to flow through the holes into the pipes. The ends of the pipes are bent over at right angles, swedged down, and drilled with $\frac{1}{32}$ -in. holes through which the air is ejected. The pipes and fan blades are securely fastened to the hub which, of course, should turn freely. Details of the construction are clearly shown in the drawing.—Frank L. Coakley, Buffalo, New York.



Novel and Inexpensive Method of Driving Ventilating Fan by Compressed Air

had become too worn to be reset in street-improvement work. The old curbstones are generally about 4 ft. long, 16 in. wide, and about 5 in. thick. They are laid flat on the bank, with their longer dimension parallel to the river channel, and the cracks are filled with cement. The slope-protection work should be started several feet below the river bed, preferably on a rock, concrete, or sheet-piling foundation.

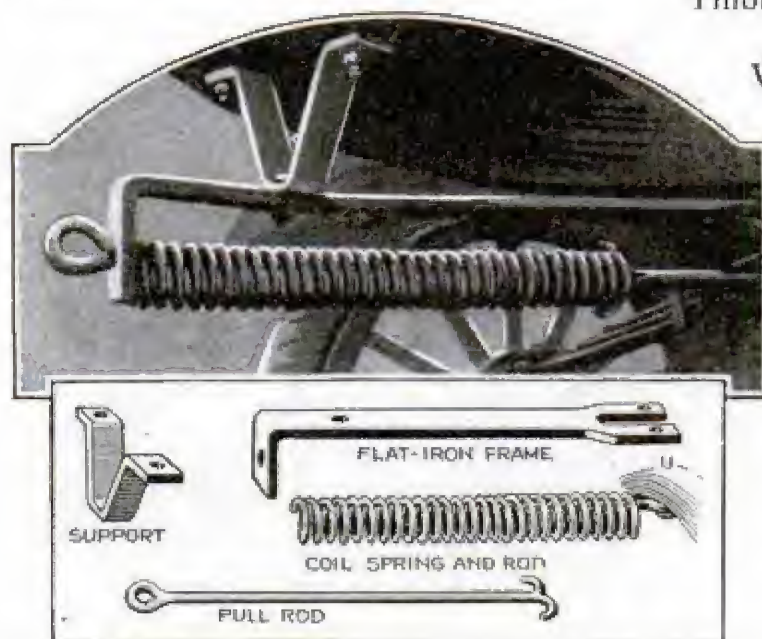
Installing Interior Trim

Interior trim should not be installed while the plaster is wet; in fact, it should not even be brought into the house until the plaster has become thoroughly dry. Wide pieces of trim, and especially wide panels, should be painted on the back before installation, to prevent bulging or buckling. If exposed end grain is saturated with thick paint, absorption of moisture into the wood cells will be prevented.

All woodwork should be cleaned before being painted and knots coated with white shellac or wiped off with a cloth moistened with benzole.

Trailer Tow Rod

A telephone company in a western city has equipped its light roadsters with homemade tow rods by which trailers are



Coil-Spring Tow-Rod Attachment on Light Car Pulls One-Ton Trailer without Jerking or Straining

attached for hauling. A piece of heavy strap iron is split at the front end (relative to the roadster) and the other end is bent at right angles and drilled as shown. This forms a frame for carrying a heavy coil spring. The tow rod itself is made of $\frac{5}{8}$ -in. material, the front end being split to hook over the front end of the spring. A shorter rod is bolted to the middle of the rear spring of the roadster to hold the coil spring in place and prevent its front end from dropping. The rear end of the spring frame is held in line by a strap-iron support, which is bolted to the back end of the roadster body. Under ordinary circumstances, the spring will not contract more than 1 in. when a one-ton trailer is pulled on level dirt roads. Usually the load is much less than this, yet the spring prevents jerking and straining.—Dale R. Van Horn, Walton, Nebr.

Pump Aids Tumble Plating

A large tumble-plating mill, having only one tumble outfit of 45-gal. capacity, used it for plating four different metals as it was considered too expensive to purchase extra tumblers. A pump was installed, which could rapidly pump out whatever solution might happen to be in the tumbler, and store it in a large barrel. After the solution was transferred in this way, the tumbler was thoroughly rinsed out before the new solution was put in. To at-

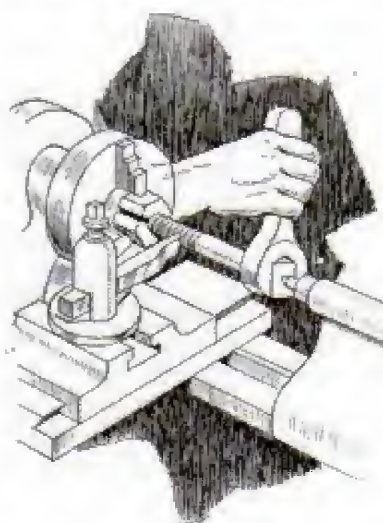
tempt baling out these highly poisonous solutions with buckets would be quite impractical and a great waste of time. With the aid of the pump the solutions could be changed in about 10 minutes.—Ralph W. Tillotson, Erie, Pa.

Wax Supply in Hammer Handle Is Convenient When Driving Nails

The hammer that carpenters use for fine finish work can be made much handier by drilling a $\frac{1}{2}$ -in. hole about $1\frac{1}{2}$ in. deep in the end of the handle. Melted wax or paraffin is poured into the hole. Small nails coated with wax by pushing them into this can be driven in much easier and are less liable to bend. It will also lessen the jar when hammering on solid material.

Reducing Oversize Bolt Thread

It was necessary in one case to reduce an oversize bolt thread. Neither threading dies nor a screw-cutting lathe was available, so I tried the following emergency method, which proved entirely successful. I picked up a nut about the size of the bolt, sawed it open on one side and spread it so that the bolt would screw in. I then put a filler piece in the sawed slot so that the nut would not close up when clamped in the lathe chuck. After making a center hole in the head of the bolt and screwing the bolt into the nut, the tailstock was brought up and clamped only slightly so that it would slip back



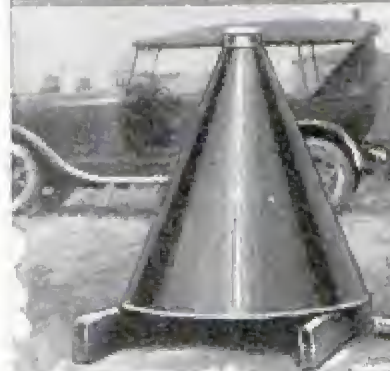
as the bolt was screwed out of the nut. While the bolt was being screwed out, a thread tool, which was set close to the nut, cut off a chip to within about one third of the thread of the end of the bolt. A couple of threads were cut off

the end of the bolt, and the bolt could then be driven into place nicely. Care was taken to clamp the head spindle so that it would not turn.—R. B. Ware, Wadsworth, Ohio.

not have revealed themselves in a square box with a large cross-sectional area.—
R. B. Hoffman, Pacific Grove, Calif.

Semi-Automatic Wrapper Paster

Pasting standard-size wrappers on packages can be greatly facilitated by using a semi-automatic wrapper paster

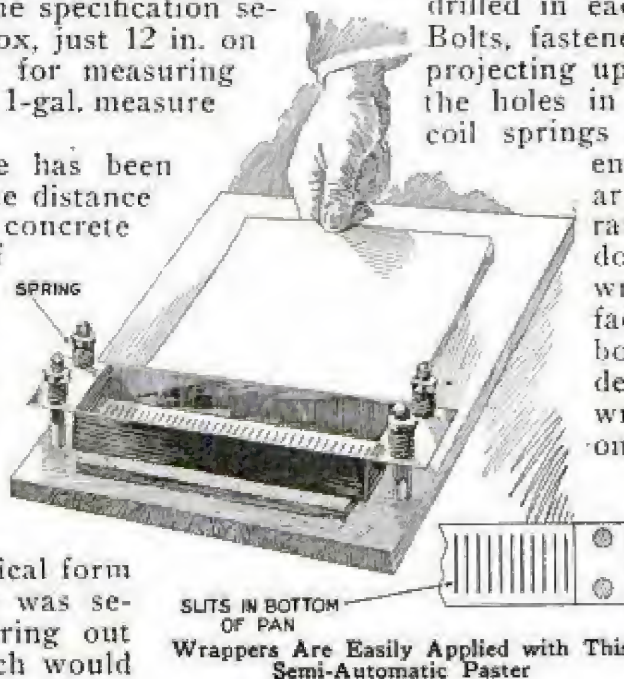


Upper Left, Testing Cone Complete; Lower Left, Cone Removed from Plate and Test Block of Concrete; Details of Cone at Right

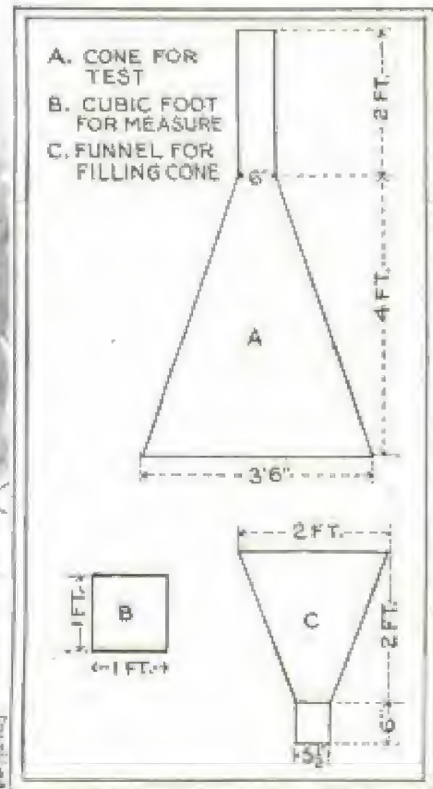
Simple Apparatus for Determining the Yield of Concrete

To ascertain just what yield or bulk a certain mixture of rock and sand will give as compared with others, is of great importance to the cement contractor. To make this test, I have used the outfit illustrated, consisting of a cone, a tube and a funnel of sheet iron of the dimensions given in the detail drawing. The lower end of the cone is flanged and a plate bolted to this flange. The concrete is mixed according to the specification selected, a cubic-foot box, just 12 in. on all sides, being used for measuring the dry material and a 1-gal. measure for the water.

After each mixture has been placed in the cone, the distance from the top of the concrete to either the top of the cone or the top of the tube is measured, and the increase or decrease in yield for different mixes is noted. Differences in yield amounting to 10 and 15 per cent have thus been found. The conical form of the test container was selected in order to bring out small differences which would



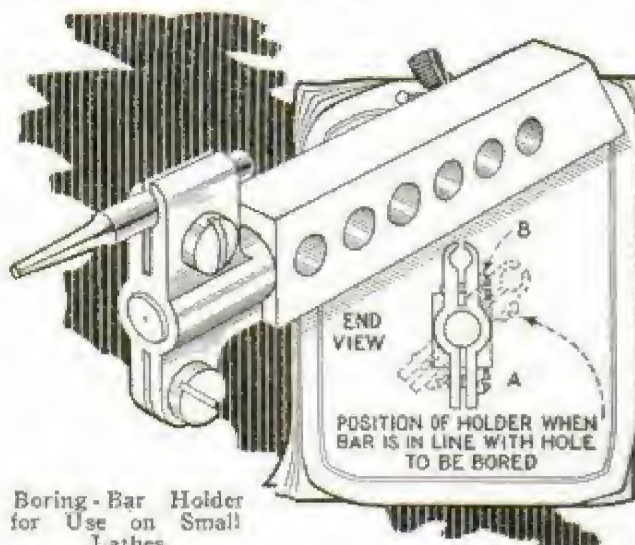
SLITS IN BOTTOM OF PAN
Wrappers Are Easily Applied with This Semi-Automatic Paster



of the kind shown in the illustration. It consists of a narrow pan, about 1 by 1½ by 10 in. in dimensions, with a bottom perforated with narrow slits, ½ in. long and about ⅛ in. apart. A flange is soldered to each end of the pan, and two holes are drilled in each flange as indicated. Bolts, fastened to a baseboard and projecting up vertically, fit through the holes in these flanges. Small coil springs are slipped over the ends of the bolts and nuts are screwed on. This arrangement keeps the pan down tightly against the wrappers, which are laid face down on the baseboard with one end under the pan. In use the wrappers are pulled out one by one and will have just enough paste, which will spread out evenly when pressure is applied to the wrapper, making a neater bundle than when using a brush.

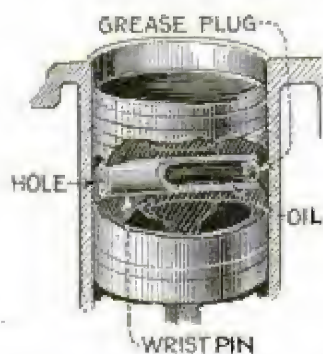
Boring-Bar Holder

The boring-bar holder shown in the accompanying drawing is for use on small



lathes where light work is done, and will be found more convenient than one of the ordinary type. The bar is held in place entirely by the friction clamp, which is tightened by the two screws A and B. Holes as small as $\frac{1}{16}$ -in. may be drilled with this type of holder, owing to the rigidity of the body and the shortness of the bars. The main body of the holder is set in the toolpost so that it is in line with the shears of the lathe. Then the end of the holder is raised or lowered, in order to set the bar central with the hole to be bored, and the two screws are tightened. The bar holder should be made of good tool steel, hardened and tempered to spring blue. When changing bars, it is only necessary to loosen the top screw, which clamps each bar in exact alinement with the hole in the work.

Lubricating Rebored Cylinders



Many a rebored and reground cylinder job has failed to stand up because the new bearing surfaces fit snugly and were not sufficiently lubricated. If the new piston is too close-fitting, the heat of

combustion and of excessive friction, prevents the oil from getting above the lower ring, leaving the upper portion without lubrication. The writer uses the method of oiling shown in the illustration

to prevent this trouble. One end of the wristpin is plugged with heavy cup grease, and the cup so formed is filled with motor oil. The opposite end is then plugged in the same way. Just before the piston is inserted into the cylinder, the grease plugs are punctured with a match stick, to allow the confined oil to flow out. The lower ring and the junk ring tend to hold the released oil in confinement and cause it to be carried up and down the cylinder wall.—C. M. Wilcox, Torrington, Conn.

Supports for Roadside Cables

Heavy steel-stranded cables are quite widely used as highway guards. It is common practice to drill the posts and thread the cables through these holes. Structurally this method is good, but in case of a collision or accident the cables restrain the automobile only until it reaches the first post, when the inside half of the post receives the impact, is uprooted or split, and the car seriously damaged. A post hit hard enough to be split must be replaced if the guard is to remain effective, and this means rethreading the cables from the nearest splice, which involves considerable labor. To



avoid this loss of time, and also to locate the cables so that they will tend to fend the car away from and thus protect the posts, one city adopted the type of clamp shown in the photo. Bolted to the post with two heavy lag-screws, the adjustable jaws of the clamp hold the cable firmly and

permit quick replacement of either post or strand without affecting the line on either side in any way.

□ A good paint for wire screen consists of dropblack, ground in oil, and about a third as much of asphaltum varnish, thinned with turpentine.

Grinding Drills for Brass

When grinding drills for brass, it is common practice to grind a flat on each lip, in order to prevent the drill from digging into the work. A better way is to flatten the cutting edge with a small oil-stone, until a face, about .010 in. wide, is attained. Thus a finer cutting edge is made and there is no unnecessary waste of the drill, such as occurs when grinding by hand.—C. Homewood, Ontario, Calif.

Soap Holder for the Workshop Washroom

A handy and convenient soap-saving device for the workshop washroom is shown in the illustration. A wide metal band is clamped around the upright supply pipe at the back of the sink, to extend to one side about 8 or 10 in., and the outer end of this band is bent to support a length of round steel rod. A piece of coil spring, with a short chain and a wire corkscrew attached, is slipped over the

upright rod, and the device is complete. The soap is attached by driving the corkscrew into the center of the bar and thus is suspended out of the way when not in use. This arrangement keeps the soap in a more sanitary condition

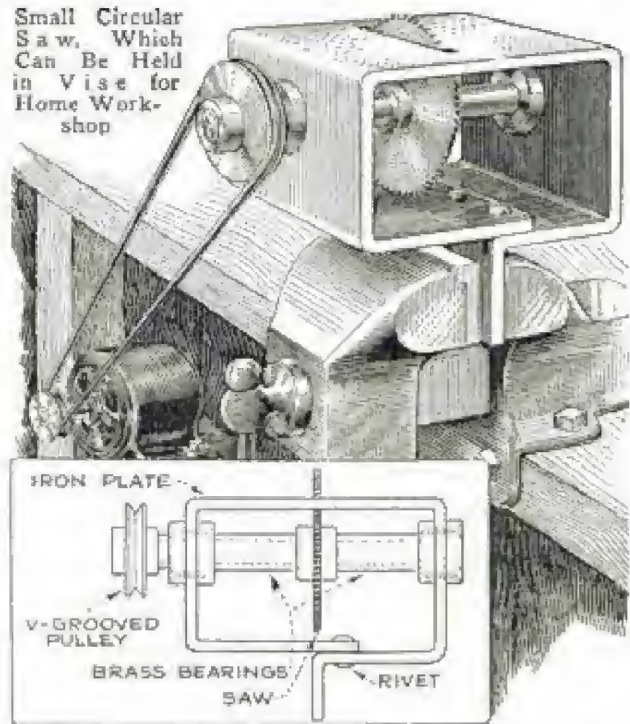


than if thrown about the sink, and a decided saving is also effected.—G. F. Hendrickson, Argyle, Wis.

Keeping Irrigation Canals Clean

In one irrigation district where the silting of the canals constitutes a serious maintenance problem, due to the settling of the fine sand carried by the flow and originally brought in with the river water, the conditions have been partly relieved by installing huge wooden water wheels at frequent intervals along the canals. The wheels are turned by the downstream movement of the irrigation water, while the turning of the blades keeps the sand stirred up so that it is carried along the canals to gate structures, where it can be sluiced back to the river channel.—Ivan E. Houk, Denver, Colo.

Small Circular Saw, Which Can Be Held in Vise for Home Workshop



Mounting Small Circular Saw in Vise

A small power-driven circular saw is a handy tool for the home workshop. Often the expense of purchasing one is not justified, but a saw of the kind shown in the drawing will be found just as convenient and can readily be made by any amateur mechanic. It consists of a frame made of iron plate, which can be set up in a vise when needed. The saw is mounted on a shaft set in brass bearings and a V-grooved pulley is provided on one end of the shaft as indicated. The saw is belted to an electric motor located at some convenient point near by, the pulley of the motor, of course, being in line with the pulley on the shaft.

Holding Round Objects with Pliers

Round objects, such as nails, taper pins, valve-spring pins, etc., are readily placed and easily held in a pair of pliers if a saw cut is made in the jaws as shown. Use two or three saw blades together to produce a broad slit. Accidental opening of the

pliers and loss of the object may be avoided by placing an elastic band around the handles.—Richard C. Tarr, Gloucester, Massachusetts.



Adjustable Roof on Hay Shed

Unless full, the ordinary hay shed does not give adequate protection against weather, as the sides are usually left open, and if the roof is 10 or 20 ft. above the top of the hay pile, it does little or no good. A Nebraska farmer built a shed with a roof, which can be raised and lowered at will. No matter how little or how much hay there is stored, the roof can be dropped directly upon it. Four stout posts, 25 ft. long, are set up at the corners and the tops are connected with stringers, which serve to brace them. At each end a smooth-planed pole, with rods driven into the ends for bearings, fits between the posts. At the center, these poles are squared and fitted with iron collars. The roof is built in the usual way, with adequate bracing underneath, and each corner is provided with a square strap-iron collar, which fits freely over the corner posts. Wire cables run from the corners of the roof, over pulleys at the top of the posts and then down to the horizontal poles at the ends. To raise the roof, two wrenches are used, as shown. One man makes a quarter turn while the other takes a new grip. When one end of the roof is raised about 3 ft., it is locked and the other end raised 2 ft., and so on.



Novel Hay Shed with Roof Which Can Be Adjusted for Height

Current Regulation for Electric Welding

Electric welding as practiced on a commercial scale, requires a current of from 75 to 200 amp. at a voltage of from 40 to 60. The work is connected to the positive terminal and the negative terminal is extended to electrodes, which are made of a suitable metal. For cast iron, for instance, thin rods of the same material are used, and for other iron, soft Swedish-iron rods are used. For light work in the

shop, however, an arc between carbon electrodes can be used to advantage, as it requires but a small amount of energy and can be fed from a lamp socket with somewhat heavier conductors, directly from a 30-amp. fuse.

Any suitable device for holding the carbon electrodes may be used, similar to the one already described in the November, 1925, issue of Popular Mechanics Magazine. The carbons used are of the arc-lamp type. A spring

mechanism should keep them separated and the proper distance should be maintained by moving the electrodes together.

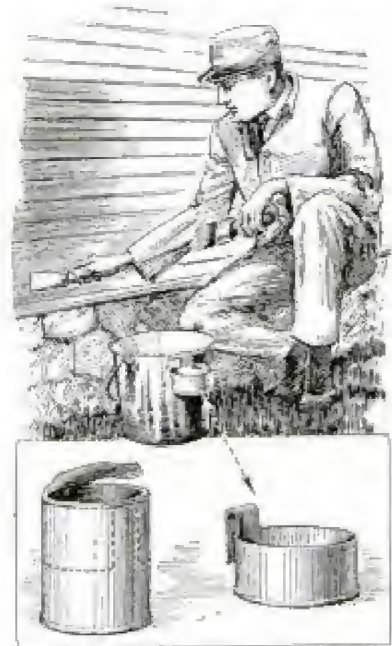
The main problem of successful work with this device lies in the proper regulation of the current through the arc, in order to have the device operative with a circuit from a 30-amp. fuse. The simplest method, which is applicable equally to direct and alternating current, is to introduce a resistor into one of the lines. This resistor can be made conveniently of No. 16 iron wire. About

150 ft. of this wire should be made into coils, about $\frac{3}{8}$ in. in diameter, and fastened to a wooden frame. The current may be regulated by placing wire jumpers across the coils, thereby lowering the resistance and increasing the current. For a stronger arc, it is recommended to place a jumper for starting only when the electrodes are brought together and removing the jumper after the arc has been drawn. Usually, however, it is easier to work with a permanently adjusted resistance in accordance with the strength of the line and fuses. A much smaller resistor can be made of short coils wound from thinner iron wire, such as No. 20 or No. 22, by placing the resistor in a jar filled with water to keep the wire from burning out. The resistance method of current control has the disadvantage, however, that a certain amount of electrical energy is wasted

in the heating of the wire. A more economical arrangement can be made with the alternating current by using a choke coil, though it is more difficult to make a satisfactory choke coil than a resistor. A choke coil designed for a frequency of 60 cycles will not work on a frequency of 25 cycles, and vice versa. The writer used a coil of the following dimensions for a frequency of 60 cycles: The iron core was $1\frac{3}{4}$ in. wide, 1 in. thick and was made of 75 laminations, each of which was about .0175 in. thick. Two coils were placed on the core, each containing 80 turns of No. 11 d.c.c. wire. The coils were connected in series. A very small air gap was formed between the ends of the laminations. The width of this gap controls the current, and with poorly assembled laminations and a larger gap, the current may become too strong for practical purposes for use with 30-amp. fuses. For first experiments with a choke coil, it is recommended to include in the circuit also an iron-wire resistor in series with the coil, in order to prevent the fuses from blowing out, in case the coil is not made right. The wire may be gradually cut out by short-circuiting its turns, until the desired strength of arc is reached. The arc will not be stable with current less than 10 amp., and the best results for light work are obtained with a current of from 15 to 20 amp. For 25 cycles the coil should have more turns and a larger core. Two coils of 120 turns each may be used with a core 2 by $1\frac{1}{2}$ in. in dimensions. A bank of electric lamps may also be used as a resistor, although such a substitute is rather expensive. The work with the arc is easy, once the resistor or choke coils are properly adjusted. Light sheets or strips of soft iron, brass, copper and aluminum can be easily welded together. It is more difficult to weld carbon steel, and it is recommended to use soft iron wire for making joints. With a certain amount of practice the ends of a hand saw can be brazed together by using a bronze alloy and borax for a flux. Care must be taken, however, not to burn away the edges of the saw. This usually happens if the arc is allowed to jump across the metal, instead of keeping it confined to the carbon electrodes.—J. P. Nikonow, New York City.

Putty Can for the Painter

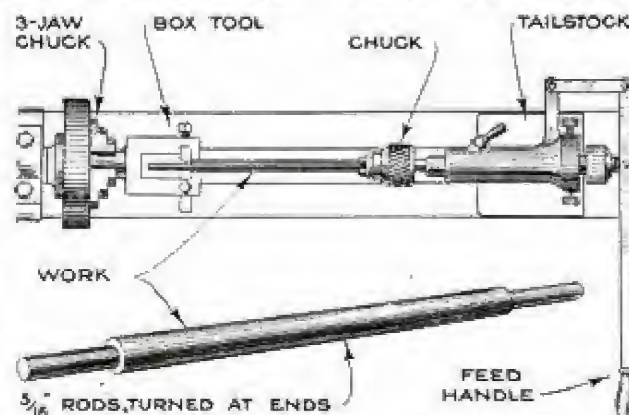
Putty is a necessary item for the house painter but inconvenient to carry when working on a ladder. If a small, clean can is cut in the manner shown in the illustration and the projecting piece bent back to form a clip, it may be fastened either outside or inside of the paint pail and will provide a handy receptacle for the putty.—R. Tarr, Gloucester, Mass.



Turning Bar Stock on the Speed Lathe

Having a large quantity of $\frac{5}{16}$ -in. rods to turn down on each end, I sought some method whereby the highest and fastest possible production could be obtained. The small turret lathes were all busy, and after some planning, it was decided to rig up a small speed lathe to do the work. A small box tool of the tangent-cut style, used on the turret lathe, was chucked in the regular lathe chuck. A drill chuck in the tailstock spindle held the work.

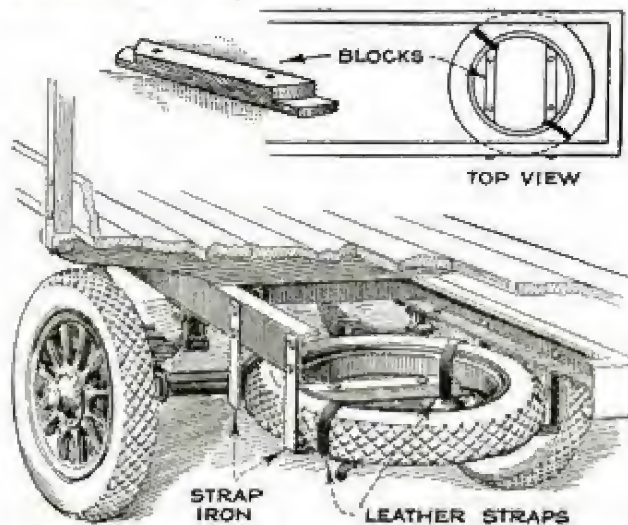
After the tangent-cutting tool was set to the right diameter, the lathe was not shut down when changing stock but was left running, the box tool rotating all the while. This is contrary to the usual practice, but works out well. The drill chuck is easily opened for the insertion or removal of a piece by a twist of the wrist. The work is fed into the tool by pressing on the feed handle. Because the lathe was not started and stopped repeatedly, much time was saved in this manner alone, and as a result four spindle ends were turned down per minute.—J. V. Romig, Allentown, Pa.



Turning Both Ends of a Large Number of Small Spindles at the Rate of Four a Minute

Spare-Tire Carrier for Truck

On many pneumatic-tired trucks the spare tire can best be carried under the frame behind the rear axle as shown. The

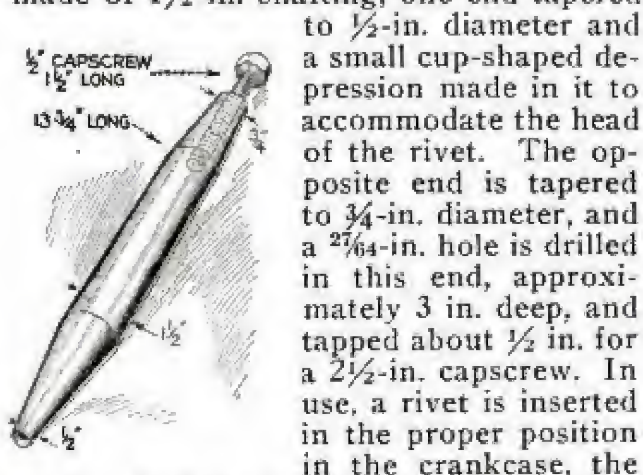


Wooden Blocks on Underslung Tire Carrier Prevent Tire from Chafing

objection to this mounting is the difficulty of keeping the tire from chafing against the parts of the carrier with which it comes in contact. A good method of preventing this trouble is to bolt two hardwood blocks, cut as indicated in the detail, to the carrier. Two heavy leather straps are wrapped around the tire and carrier at diagonal points to keep the tire on securely, and a heavy chain with a padlock is used to prevent theft.—G. C. Douglas, Raleigh, N. C.

Riveting Crankcase Supports

Ford repair men are well aware that the job of riveting the crankcase rear-supporting arms in place is awkward for one man, and will find the tool shown in the illustration convenient for this purpose. It is made of 1½-in. shafting, one end tapered

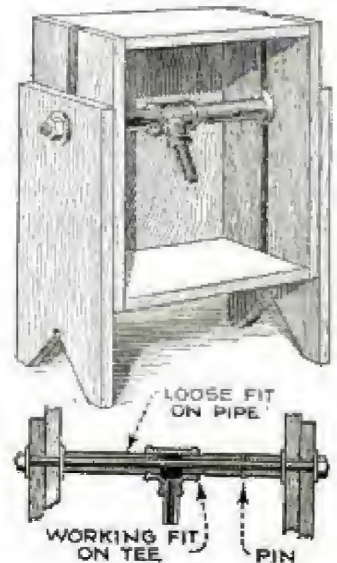


small end of the tool being placed against the rivet and the cap screw at the other end against a corresponding rivet on the op-

posite side of the case. The cap screw is tightened until the tool firmly supports the rivet to be driven in, and the work of riveting is done easily by one workman. The idea can, of course, be adapted to various situations other than the one just described.—Edwin Kilburn, Spring Valley, Minn.

An Adjustable Bench Stool

Many shops provide seats to be used when doing bench work that can be performed better while sitting. The illustration shows a bench stool which is adjustable for height, so that the workman can change it to the best possible position for the particular job in hand. The actual seat consists of a strong box, about 2 ft. high by 18 in. wide, the entire box being utilized with the exception of the lid. Along both sides, in the middle, a strip of wood is cut away to leave a slot about ½ in. wide. Two pieces of wood similar in width and thickness to the box sides, serve as legs and are drilled near the top to receive a ½-in. iron pipe. The pipe is threaded at each end, and passes through the holes in the legs and the slot in the seat sides, being held to the former by nuts and washers, so that the seat can slide up and down. To tighten it in any required position two pieces of larger pipe are fitted over the ½-in. pipe and connected by a tee. To obtain this effect in one movement, one of these pieces is screwed tightly into the tee and the other is left loose. A washer is placed between the ends of the pipes and the box, and when the tee is turned by means of the short piece of pipe on the branch, the distance between the ends of the piping is increased and the legs and box are bound firmly together. To keep the loose pipe from turning when the tee is turned, a hole is drilled in the ½-in. pipe and a larger one in the outside pipe and a pin then driven into the former.



Ⓛ Draftsmen should never let a tracing lie in the sun between the time it is traced and finished.

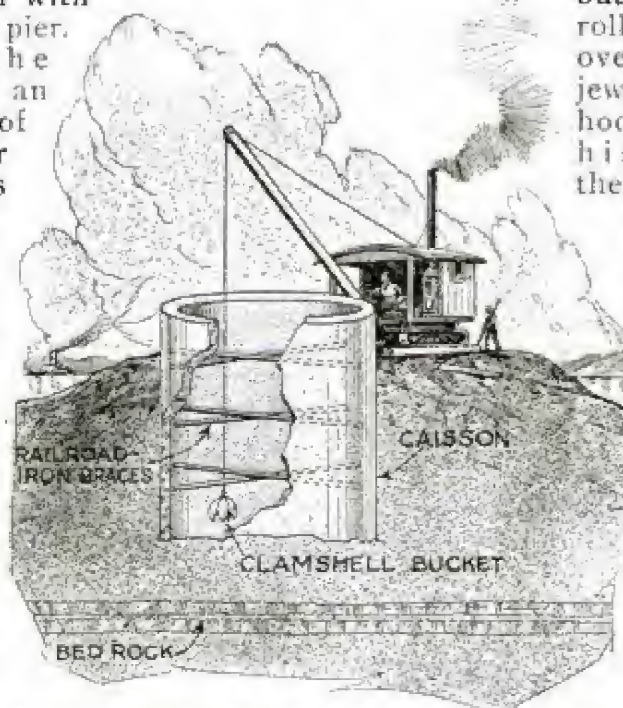
Emergency Micrometer

I had occasion to pick out a piece of packing, which had to be of an exact thickness, and there was no micrometer available. After looking the tools over, I picked out a feeler gauge and a small C-clamp to serve as a substitute. The clamp was screwed down lightly on the feeler-gauge leaf of proper thickness, just as if it were a micrometer, and attention was paid to where the slot in the screw head stopped. The clamp was screwed down on various pieces of shim stock until a piece was found that stopped the screw on the same position. Later measurement with the "mike" showed the piece to be right. I have used this method several times since and found it to be highly satisfactory.—John A. Blaker, West Auburn, Massachusetts.

Caissons Substituted for Cofferdams

Caissons, somewhat similar to those used in sinking deep foundations for unusually large bridges, can also be used economically in building the comparatively shallow piers required for bridges of smaller size; only in the latter construction the caissons are left open at the top, instead of closed, and the men work under atmospheric pressure, instead of in compressed air, the water level being kept down by a centrifugal pump in one corner of the caisson. The caisson is built of concrete and is merely a shell of such size and shape that, when sunk to the proper depth, it can be filled with concrete to make the pier.

It is built above the water level, either on an island or on a pile of gravel thrown up for the purpose, and is sunk by excavating the material inside by hand and lifting it out in a clamshell bucket operated by a dragline or derrick. Old railroad rails make ideal braces for the inside of the caisson while sinking, since they occupy but little space and can be left in, if desired, to strengthen the pier when concreting the interior.—Ivan E. Houk, Denver, Colo.



Concrete Caissons Used for Excavation in Bridge Building Serve as Piers When Filled

Bending Iron on Grooved Rail

Lengths of steel rail are well-known shop facilities and are commonly used for riveting and straightening.

In one shop the employees have found another use for the rail block by grinding or planing a tapered groove in the face, as shown in the illustration. The ease with which square, round or flat stock can be bent in this groove is evident. It should have a



gradual taper so that either sharp or round bends can be formed. Of course, the rail should be drilled and bolted solidly on the bench top at a convenient height.—G. A. Luers, Washington, D. C.

Kink for Jewelers

Jewelers, watchmakers, and other tradesmen who work at the bench with fine tools and small instruments, are often inconvenienced by the loss of some small

but important piece that rolls off the bench. To overcome this trouble one jeweler placed two small hooks on the underside of his workbench, spacing them about 3 ft. apart, and set two brass eyelets into the extreme lower corners of his work apron. Now, when employed at the bench, he fastens the corners of the apron onto the hooks beneath the bench, and any small pieces accidentally dropped or brushed from the bench are certain to be caught in the apron and easily found.—G. E. Hendrickson, Argyle, Wisconsin.



Getting Rid of Cooking Odors



By EDWIN M. LOVE

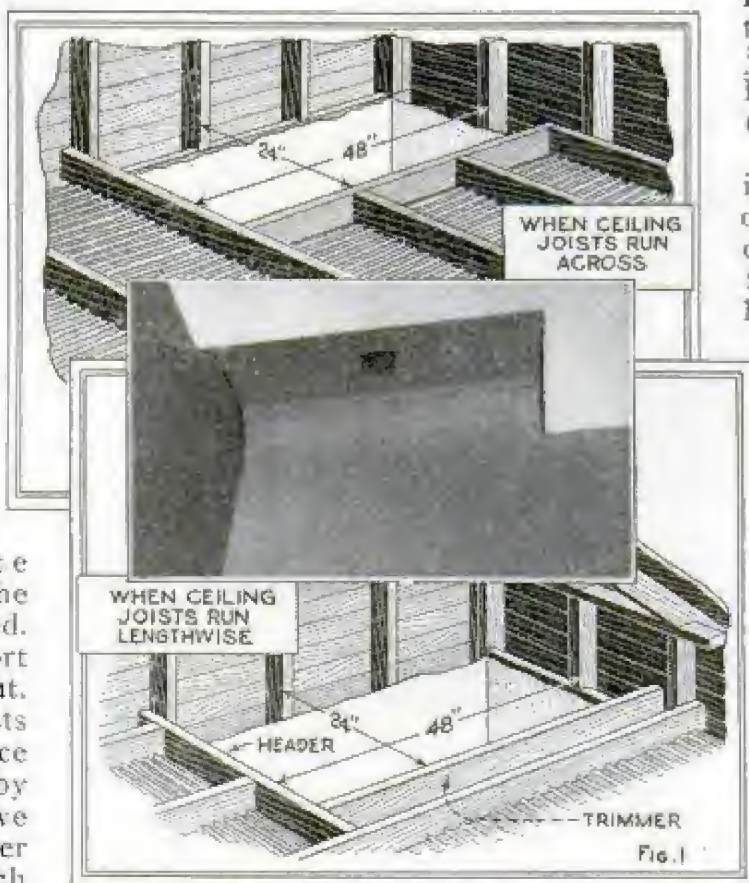
A CEILING vent over the kitchen range is valuable not only to dispose of undesirable heat during the summer, but also to carry off cooking odors the year round. While most recently built houses have such ventilating hoods, many older homes have none, and would be greatly benefited by such an addition.

The neatest type is that illustrated in Fig. 2. This consists of a semicircular or elliptical depression in the ceiling with a rectangular hole in the center, through which the cooking odors escape. It requires about 2 ft. of clearance or rise of the roof above the ceiling joists for operation, and is therefore unsuitable for placing under the eaves. The ceiling opening is trimmed as nearly 2 by 4 ft. as possible. If the length of the opening lies across the ceiling joists, get above the joists, if possible, and nail a piece of 1 by 4-in. or 6-in. wood across several, about 3 ft. back from the wall plate against which the hood is to be nailed. This will support the joists to be cut. Select four joists embracing the space to be occupied by the hood, and drive through the plaster a small nail at each

outer joist. Using these points, lay out on the ceiling the rectangle to be cut, 2 ft. wide, and remove the plaster by cutting around the mark with a cold chisel. Cut the laths with a compass saw. From above, cut off the ends of the two inside joists 2 ft., plus the thickness of the 2 by 4-in. header to be nailed on the ends from the wall, and fit the header tightly between the end joists. Spike thoroughly, driving the nails with light blows to avoid cracking the plaster. If the joists run lengthwise of the opening, only one joist section will need to be cut out besides the backing joist at the wall plate, but a trimmer will be necessary between the two

headers, or between the header and adjacent wall if the hood is in a corner. (See Fig. 1.)

To build the hood itself, lay out eight quadrants (quarter circles) having a 1-ft. radius, on lengths of 1 by 10-in. stock. Miter the ends to form pairs, as shown in the detail, and saw out the curves with a compass saw, nailing cleats over the joints to assemble the sections. The notches shown at the bottoms of the curves are $3\frac{1}{2}$ in. high and $1\frac{1}{2}$ in. wide, and are



designed to fit over the sides of the ceiling opening. The four arches being completed, assemble them, in the manner shown, by nailing on the ends flush with the notched pieces of 1 by 4-in. stock. Secure rigidity by nailing, across one slope of the top, a third 1 by 4-in. piece. This done, build a rectangular jamb of surfaced 1 by 4-in. stock, rabbeting the ends into the sides, and making it 3 in. wide inside and just long enough to fit snugly between the two middle arches. Nail in place flush with the curved edges, and cover the top with screen wire to keep out flies.

Push the frame up through the openings and rest the notches on the trimmers or headers, as the case may be. Toenail through the 1 by 4-in. side braces into the trimmers. It will be seen that, thus far, provision is made only for lathing the curved surface. To catch the ends of the laths on the flat hood ends, nail onto the end arches projecting pieces of 1-in. stock.

If the hood is to be plastered, lath with $\frac{1}{4}$ -in. spaces between; but if it is not desired to go to the expense of hiring a plasterer for so small a job, lath tight and paste on a muslin lining, over which wall paper or sanitas may be pasted.

Where lack of space above the ceiling prevents the use of a flush hood, one in the general style of Fig. 3 must be used. Build a front frame of 2 by 3-in. stock, making it 2 by 4 ft., with the four studs equally spaced. The upper plates of the ends are cut 2 ft., minus the width of front and back plates; the lower end plates, extending as they do to the wall, are 2 ft., less one width. Assemble with the front frame by toenailing to the front plates and to the rear upper plate (which is cut to run full length) and by spiking in two studs, as shown in the drawing.

Cut a piece of 1 by 6-in. stock about 3 ft. 10 in. long for a jamb front, and, centered on the length, cut two $\frac{3}{4}$ -in. grooves or dados, $\frac{3}{8}$ in. deep and 6 in. apart. Complete the vent jamb as shown, using 1 by 4-in. material, rabbeting the back into the sides. The inside measurements are 6 by 6 in. Cover with screen wire. Cut out the back upper plate and nail the jamb in the opening, the ends of the wide front jamb notching over the end plates. Using 1 by 4-in. stock, cut four rafters to butt against the front jamb and toenail to the sides of the front studs, as shown.

For this hood, an opening, 10 in. wide and 4 ft. long, must be cut in the ceiling.

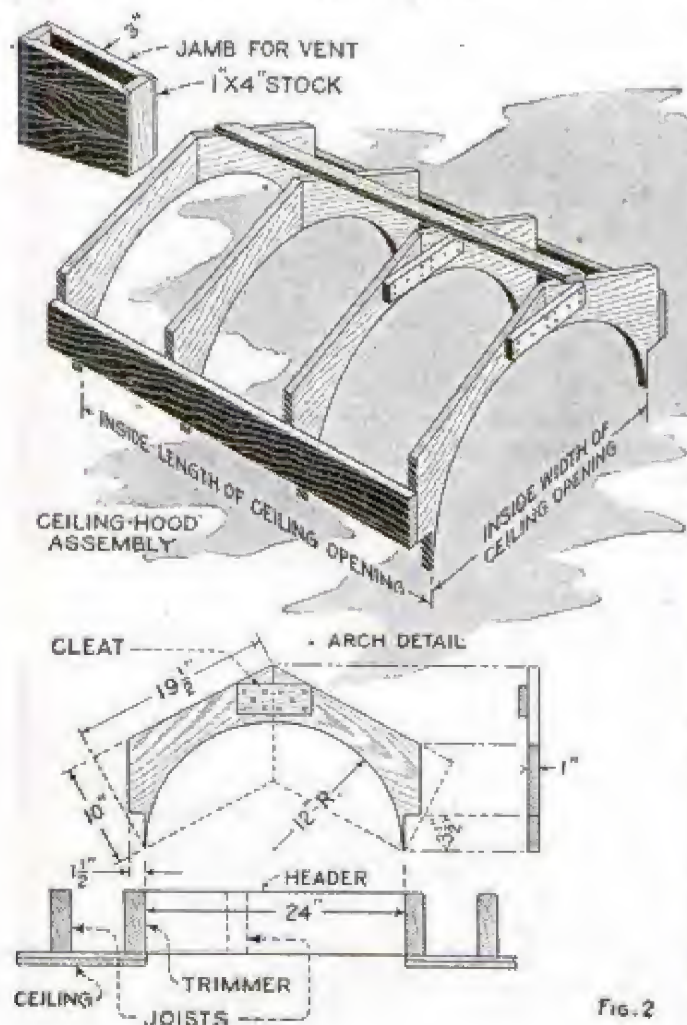


FIG. 2



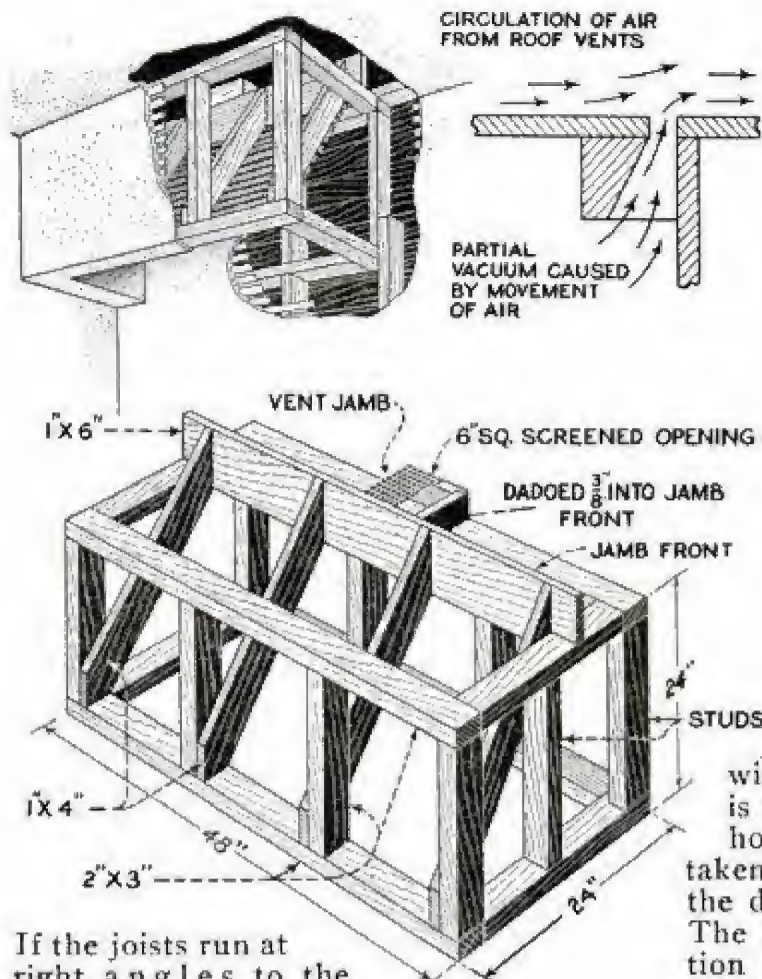


FIG. 3

If the joists run at right angles to the length of the hood, alter the shape by using a 1 by 4-in. piece for the front jamb, dropping the jamb down until the top is flush with the top plates. It is then only necessary to cut a hole, 6 in. square, in the ceiling.

To put up the hood, brace the assembly with light strips tacked outside, prop in position and drive 16-penny spikes through the upper plates into the joists. If possible, locate the hood so that the backs of the ends may have nailing in the wall studs; but if this cannot be arranged, attempt to secure them by nailing into the plaster, and stiffen by nailing diagonals inside. Now lath up the slope, and on these laths nail 1-in. stock, sloping from the corners at the front to the vent jamb. Nail corresponding strips to the plaster at the back of the hood, and lath up the ends, forming the end slopes.

To avoid plastering expense, the whole may be covered with plaster board instead of being lathed.

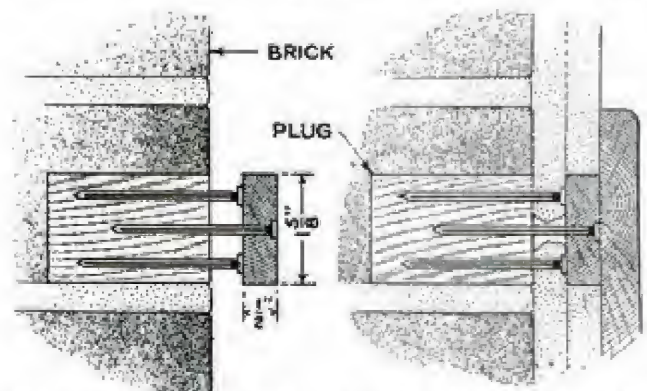
The theory of the action of the hood is as follows: The circulation of air under the roof, blowing in one roof vent and out another, reduces the air pressure slightly over the hood vent, such a vacuum varying with the speed of motion of the air above. As a result, air from be-

low the hood is drawn up through it. Little material is required for either type of hood. The average home mechanic would have sufficient scraps for the building of the circle hood. For the hopper type, the following stock is required:

1 piece, 2 by 3 in. by 12 ft., pine or fir, S1E.
 1 piece, 2 by 3 in. by 16 ft., pine or fir, S1E.
 1 piece, 1 by 4 in. by 10 ft., pine or fir, S1E1S.
 1 piece, 1 by 6 in. (or 4 in.), pine or fir, S1E1S.
 1 sheet of wallboard, 4 by 8 ft.
 Cost of materials, about \$2.25.
 Either hood requires about 8 hours' labor.

Blocking Out Plaster Grounds

Brick walls are supposed to be straight, but the mechanic who follows the bricklayer to put on plaster grounds, finds that they are usually not so straight. Wherever the brick wall is not straight the grounds must either be backed out with a scrub plane or blocked out. It is not necessary to use the scrub plane, however, as the high points can be taken for the wall line, which is shown by the dotted lines of the right-hand figure. The left-hand detail shows a cross section of a ground in place ready for the plasterer. It will be noticed that the ground is nailed to a wooden plug, driven into the perpendicular joints of the brick work. Ordinarily wooden wedges are used for blocking out grounds, but the operation is simplified and will give better results by using wooden blocks. As shown in the left-hand detail, two nails have been driven into the plug. The heads of these nails should project a little beyond the wall line, shown in the right-hand figure by the dotted line. When the ground is nailed over the two blocking-out nails, it can easily be brought to a perfect line by



Proper Method of Blocking Out Plaster Grounds Straight on Irregular Walls

using a block of wood and driving the three nails down at once, until the face of the ground comes to the plaster line. This

method has been used repeatedly by the writer and has been found both substantial and labor saving in all cases.—H. H. Siegele, Emporia, Kans.

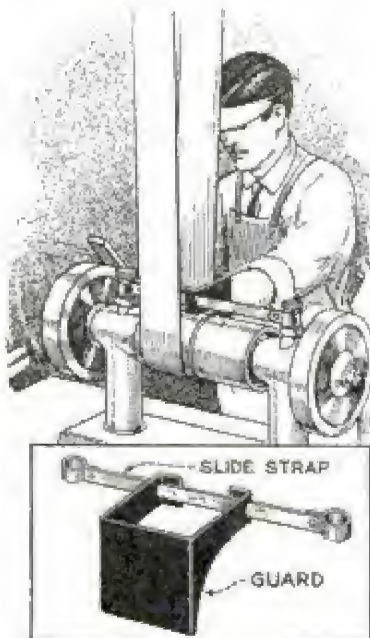
Greased Drill Holds Borings

When holes are to be drilled in parts, such as transmission covers, manifolds, etc., where it is undesirable that the cuttings should reach the inside, proceed as follows: Drill the hole only part way through, then grease the drill well. The cuttings will cling to the drill and can be lifted out of the hole. The same method is used with the tap for threading the hole. For best results, the drill or tap should be removed frequently, the grease and cuttings wiped off and new grease applied.

Combination Belt Shifter and Guard

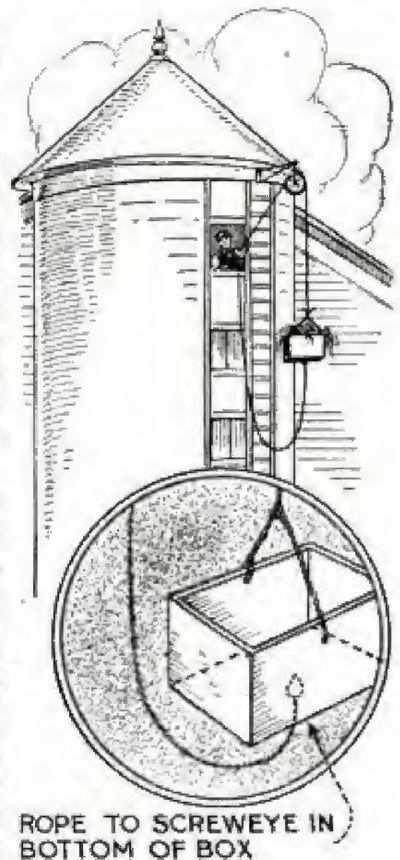
Buffing and polishing machines are not, as a rule, provided with belt-shifters, and the operator generally uses a stick, or even his hands, to transfer the belt from the fixed to the loose pulley. Most belt-shifting devices are useless on these machines, because they are in the way and often obstruct the operator when working on long or awkwardly shaped jobs, but nevertheless the methods of moving a belt just men-

tioned are dangerous and have resulted in many accidents. However, it is an easy matter to rig up a belt shifter that will also form an effectual guard for protecting the worker's elbows, when standing sideways. Fasten a length of strap iron in the manner shown, to the oil cups on the machine. Then cut and bend the shifter guard as shown, drilling two holes to pass it over the slide strap, and afterward bend these lugs over to hold it square. The belt is moved by gripping the sides of the shifter and sliding it.—Harry Moore, Montreal, Canada.



Storing Ensilage

Silos on the farm sometimes are so packed with ensilage that it is almost impossible to use any other door than that at the top. One farmer recently devised a method of getting out ensilage with ease. A ladder was used to reach the top door of the silo; a bracket and pulley were attached over the door, and a box was used to bring the ensilage down by means of a rope, as shown. As the farmer was alone to do the work, the box was made self-emptying, as follows: A screw-eye was set into the bottom of the box and a small rope run from it to the top of the silo. As soon as the box reached the ground, it was emptied by pulling this rope. It is possible, of course, to use the same rope for hoisting, lowering and emptying the box by making it twice as long as the silo is high. This is suggested in the drawing.—Charles Latour, Jr., Plattsburg, N. Y.



Oil Pads in Shock Absorbers

Certain shock absorbers on Fords have a recess in the casting or forging clamped to the spring of the car. This recess is occupied by the ends of the special bolts that compress the spring for removal. It has been found good practice to fill this recess, through the hole in the top, with waste well soaked with oil. The vibration of the car when running forces some of the oil out on the spring.—E. T. Gunderson, Jr., Humboldt, Iowa.

☐ The rope-and-pulley method of drawing water from a well may be made much easier by using a bucket at each end of the rope; the empty bucket, on its way down, serves as a partial counterweight, to the full bucket.

Homemade Duster for Boll Weevil

For dusting cotton-boll weevils with poison, the homemade device shown in the drawing is resorted to in many parts



Improved Method of Dusting Cotton Fields with Poison for the Boll Weevil

of the south. Tied to the ends of a light but rigid frame, two cloth bags carry the poison powder. Each bag incloses an endpiece, which gently taps the bags as the duster is carried along by the worker. This tapping action makes possible a fine, even distribution of the powder by a slight wrist movement, instead of a more uneven dusting, which would result by shaking the bags up and down. It is claimed that an acre of young cotton can be dusted with this device in about thirty minutes.—Allen P. Child, Kansas City, Mo.

Drafting-Room Kinks

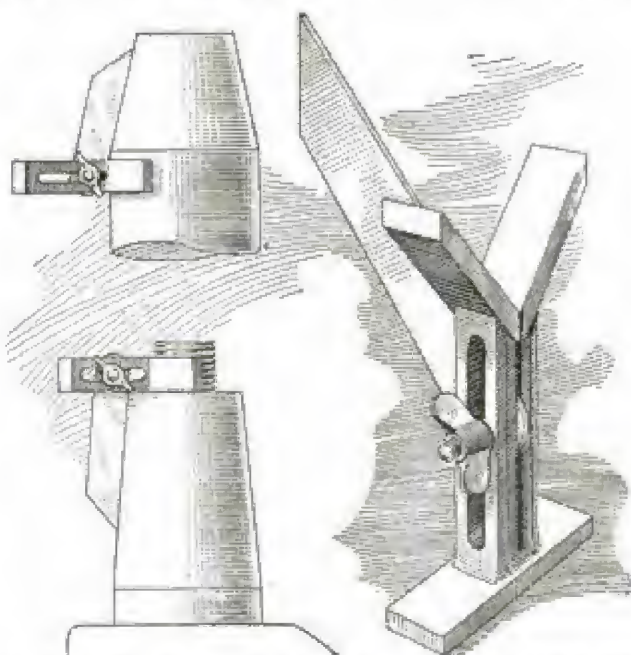
A double-pointed pencil, for drawing the guide lines used in regulating the height of lettering, can be made as follows: Take two pencils and make them flat, which can be done by filing or by holding them against a sander. Bind them together with a couple of rubber bands. As is evident, this method of binding readily allows the pencils to be taken apart for sharpening. To make a double ruling pen for drawing border lines, representations of railroad tracks, etc., obtain a piece of $\frac{1}{4}$ -in. brass rod and thread it into a

crosspiece that has two tapped holes in it to take the pens. Most drawing pens are screwed into their holders and can be unscrewed and attached to the improvised handle. When the double pen is used, border lines always are sure to be of equal spacing.

A square can be held in close contact with the drawing board by screwing a small block of lead or brass to the underside of the top wing of the T-square. If you have trouble in keeping lines parallel, investigate the condition of the edge of the board against which the T-square is held. Quite likely you will find it uneven. To remedy this attach a strip of 1 by $\frac{1}{8}$ -in. cold-rolled steel to the board.

An Improvised Swallow-Tail Bevel

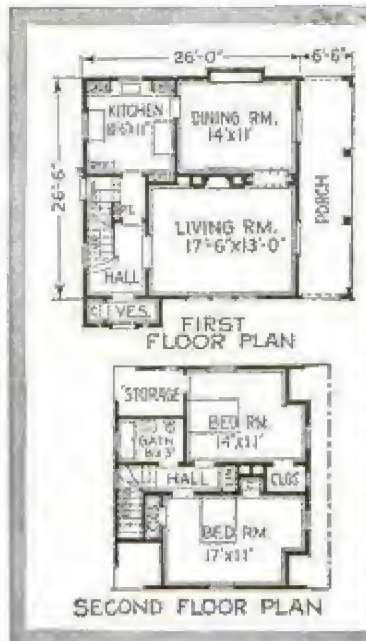
The swallow-tail bevel shown in the drawing is a good tool with which to set lathe rests to turn tapers. It consists of a cast-iron head, forked on one end and T-headed on the other, and slotted to take a pivoted blade as shown. The plane of the slot in which the blade works is an accurate bisector of the angle at the forked end, and the width of the forked end is the same as that of the T-headed end. The tool is used as illustrated, the forked end serving as a V-block. To transfer the angle to the lathe rest, a parallel is laid across the bed of the lathe and the bevel placed thereon, the head resting against the faceplate. The compound



A Swallow-Tail Bevel Used to Set Lathe Rests for Turning Tapers

rest is then adjusted to the angle indicated by the blade.—Herbert A. Freeman, Wilimantic, Conn.

A Prize-Winning Small House



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Plan No. SC10

QUESTIONS regarding home building addressed to this magazine will be answered by the Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and indorsed by the department of commerce, United States government. Blueprints, specifications and material lists for the house shown above may be obtained at a nominal cost. Inclose self-addressed, stamped envelope for reply. If further information is desired send five cents and stamped envelope for a 24-page booklet explaining how the small home bureau functions and showing twelve sample plans.

THE house illustrated here deserves careful study, not only because of the architectural merit, but because it gives you an opportunity to put into practice sound economy in space, material and equipment.

There are five good rooms, bath and porch, in addition to considerable storage space and plenty of closets. The house is of frame construction, siding or shingle exterior and shingle roof. It is designed to face north or west, but can be reversed for other facings. It can be placed comfortably on a forty-five-foot lot.

The porch, which stretches the full depth of the house, can be glazed or screened, and will provide an excellent living room for the summer months. It would be possible to make this an all-year-around porch, if the home builder desires. There is a full basement under the entire house and this includes the vestibule. The two spacious bedrooms on the second floor provide cross circulation of air and cross light. The kitchen has been planned to economize steps and labor.

Home Builders' Questions

Q. Please let me know if it is necessary to put a separate footing of concrete in the center of the basement floor to put the posts on that support the first floor?
A. The posts in the basement must rest on separate footings. There should be a six-inch-high concrete base in the center of these footings. This brings the base of the posts up above the basement floor and protects them from rotting.

Q. Is it satisfactory to use steel casements in a New England colonial house? The walls are of brick.
A. Double-hung windows of wood construction are in better keeping with the style of this house. Steel casements are more suitable to the English and Spanish styles.

Q. What part of the total cost of a frame house is made up of the lumber?
A. About twenty-five per cent and with millwork included, about fifty per cent.

Q. You speak of the cost of building a home varying with the kind of specification that is supplied. Will you tell me what you mean by this?
A. A house costs more or less depending upon the quality of finish that is used, the character of the mechanical devices and to what extent luxuries are included. By this we do not mean to infer necessarily that the simpler things are less durable or that they are not, if well handled, of good appearance. For example, you can reduce costs on your house if you use the cheaper woods for flooring and wood trim and if you do not employ the more expensive methods of finishing the surfaces. This applies all the way through the house and to a great many different items. You can double the amount of money you must spend for heating and plumbing fixtures without improving the accommodations of your home or making it more comfortable to live in. Remember that woodwork fittings like linen closets, kitchen cabinets, ironing boards and similar items are expensive. Under the heading of luxuries may be listed sunporches, window blinds, partitions in the basement, extra china closets, built-in cupboards, etc. The desirability of these things is unquestioned, but the owner may not be able to afford them. The home builder must decide what he requires as to room space and how completely and with what elaboration he can finish the building. The cost of construction can be varied at least twenty-five per cent in this way. If you will scale down your requirements as to finish and equipment, you can build a substantial and comfortable home at a surprisingly low figure.

Q. Is it good practice to insulate the roof of a house? Are there any savings to be gained in heating? Would insulating the ceiling of the second floor be enough without attempting to insulate the roof in the attic?
A. We recommend insulating between the rafters wherever they form part of the wall of rooms in Dutch colonial architecture. Otherwise it is easier and cheaper to insulate between or on the ceiling joists of the second story.

THE PROOF OF THE PUDDING

I got KFI on your Super-Eight last night, and it could be heard three blocks.—Geo. H. Abrams, Barberton, Ohio.

Just finished wiring that perfect-tone-six last night, and it is as perfect in tone as it is good on distance.—R. LaFontaine, Auburn, Me.

I am happy to state that I have succeeded in building the two-tube loud speaker set of May, and find that it performs even better than the article said it would.—Herbert White, New York, N. Y.

I am using the one-tube pocket receiver described in the July issue, 1925, and am well pleased with it, as I have received programs west of Chicago and south to Miami, Fla., and Fort Worth, Tex., clearly and with good volume.—H. S. Dillon, Turners Falls, Mass.

I have constructed the perfect-tone-six described in the November issue, and have had remarkable results with it. Cuba, Toronto, Hot Springs, Ark., and Hastings, Nebr., have come in very clearly and with good volume. This is known to be a bad locality for radio, yet I have had quite good dependability from it. Its tone quality is unbeatable.—Chester B. Lord, Jr., Endicott, N. Y.

I am and I shall ever be a constant reader of Popular Mechanics, because I know it pays me many times its price every month. Through the Shop Notes and Amateur Mechanics I have made many improvements in our home, and have made toys such as the "Walking Wampus," "Kicking Mule," etc., which have made the kids happy.—Pedro C. Alejandrino, Bulacan, P. I.

I just finished assembling the perfect-tone-six yesterday noon. I opened the switch and tuned in KDKA the first thing; it was very loud and clear as a bell. Last night I got Florida stations and several far-off programs. Am more than pleased with it so far.—F. A. Partridge, Hilliards, Pa.

The best article in the last Popular Mechanics was the one on firing furnaces. I had a terrible time trying to keep the house at an even temperature before, but now, by following the directions in P. M., I can get by with firing twice a day, and keep the temperature within 5° of where I want it for the whole twenty-four hours.

Showed it to a steam-shovel engineer, and he studied it like the preacher studies the good book and said he was going to try it, as he had been trying to keep his grates free from ashes and a level layer of coal on his fire, but had noticed that some firemen kept up steam with a whole lot less coal and less work, using the same shovel on the same job, than others, and he was pretty sure that was the reason.—Raymond Kilbourne, Hudson, Ohio.

I heard the 8-tube superheterodyne receiver built from the articles that appeared in the February and March, 1925, issues and wish to build one just like it.—G. L. Lord, Iron Mountain, Mich.

I received the blueprint No. 102 of the perfect-tone-six receiver described in the November, 1925, issue, and must say it certainly is very descriptive. The wiring is shown so clear and heavy you can almost feel it.—Jack T. Falk, Fort Terry, N. Y.

I have built one of your 1925-model superheterodyne receivers, and it is giving most excellent results.—C. E. Beck, Kansas City, Mo.

Having made the 4-tube set described in the August, 1925, issue, I am more than satisfied with it.—Wm. Vipond, Detroit, Mich.

In the October, 1925, issue you described a three-tube low-loss receiver. I built this set to your specifications, using all of the parts that were called for, and

obtained good results.—Geo. P. Miller, Flushing L. I., New York.

In the November, 1925, issue you gave instructions for building a radio set called the perfect-tone-six. I built two of these sets and will say that the tone is far better than I expected.—V. W. Floyd, Seattle, Washington.

I built the simple a.c.-tube receiver described in the December, 1925, issue. I never built a set before or tried to, and this set worked the second time I tried it; I never altered a thing so far. I have all the material for the six-tube receiver and later I will build it; all the fans here are interested in the a.c. tubes, and I had a good audience this evening in my store to hear my new creation. I have a good loud speaker, and the tones of the violin and cornet from Zion, Ill., are perfect.—E. T. Fenton, Williamson, N. Y.

I have built the nine-tube superheterodyne; the set is fine, and everyone who has heard it states that it is the best they have ever listened to. Am getting coast to coast now, and hope to get across when the tests are on.—J. C. Schultz, Aberdeen, S. Dak.

I built the perfect-tone-six receiver described in the November, 1925, issue, and have the set in a cabinet that I built myself. The tone is the finest I have ever heard, in fact, there isn't anything that compares with it. I have had Tampa, Fla., Fort Worth and San Antonio, Tex., Davenport, Iowa, and Boston; also many other stations. It is a wonderful set and I recommend it above all others. It is the easiest set to build that I have ever tackled. My hat is off to Popular Mechanics Magazine.—O. W. Weisel, Philadelphia, Pa.

I have built the simple crystal receiver described in the November, 1925, issue and find it very satisfactory.—Herbert Gunther, New York City.

I have constructed the two-tube loud speaker set described in the May, 1925, issue, of your magazine. I obtained good results, but recently I added another stage of a.f. amplification and secured more volume and excellent results.—L. Ladd, Needham, Mass.

I have built the one-tube receiver you described in the April, 1924, issue; this was the regenerative set using the variometer. I have had really wonderful results with it, receiving as far as San Francisco, Florida, Wyoming and also the Canadian stations. Another distant station I received was St. Johns, New Brunswick; all came through very clear.—Harold J. Power, Worcester, Mass.

I built the three-tube a.c. set described in the December, 1925, issue; I have just completed it and must say that I get fine reception. I was able to log Dallas, Tex., very clearly.—E. Bushek, Cleveland, Ohio.

I built the two-tube loud speaker set you described in the May, 1925, issue, and find it to be a very good receiver.—Samuel Smith, Kansas City, Mo.

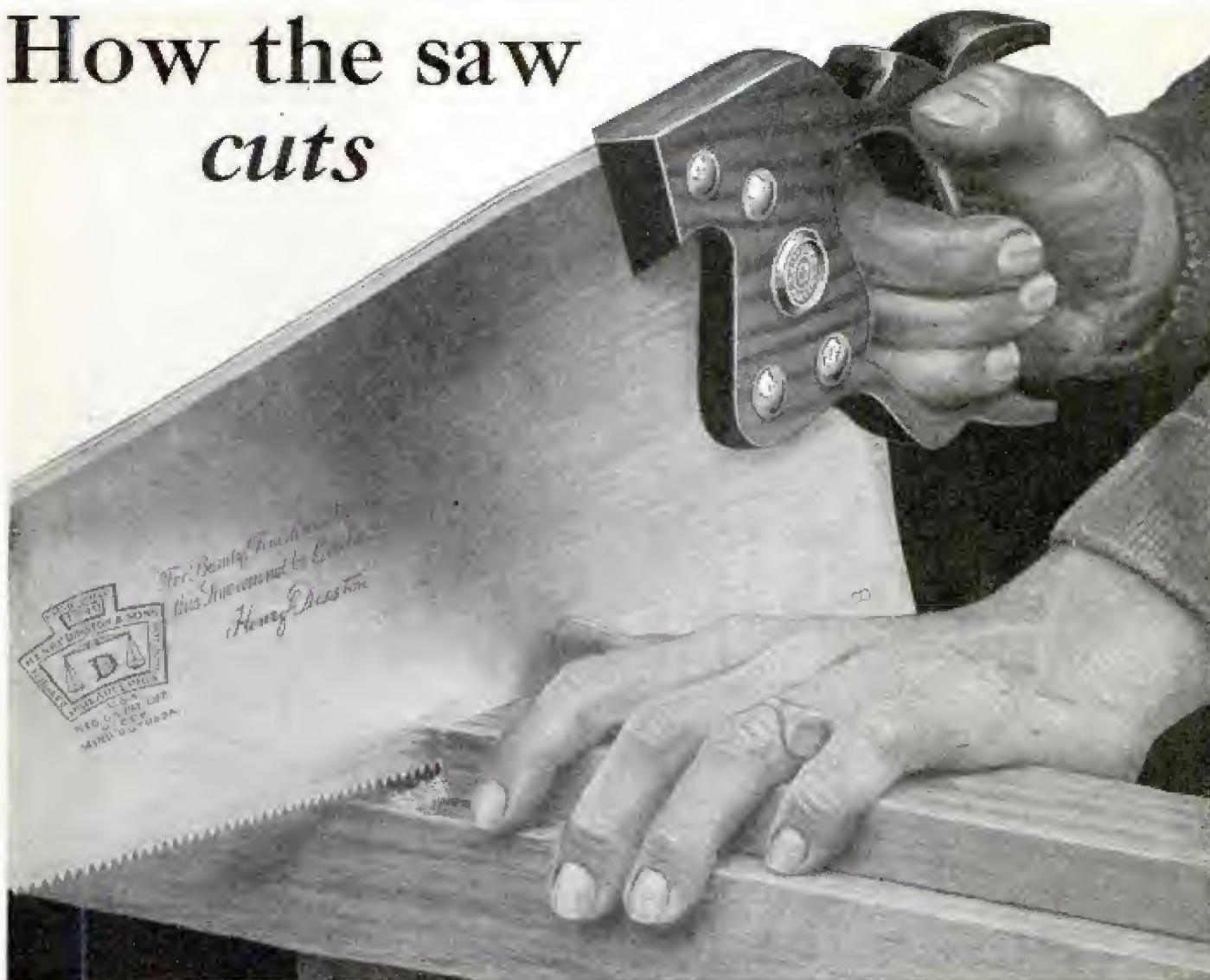
I have built the four-tube loop set you described in the August, 1925, issue, and it has proved to be a fine set.—H. Berg, New York City.

I have built your superheterodyne receiver and there is nothing that can touch it. I tested it out against several other superheterodynes and it won out easily by bringing in Los Angeles and New Orleans, on a warm night; it certainly is a wonder set and the Popular Mechanics Magazine deserves great credit.—Albert W. Perkins, Lansdale, Pa.

We assembled one of your nine-tube superheterodynes in our school; splendid results were obtained and we regard the set as about the best thing obtainable in this line.—Weir High School, Holidays Cove, W. Va.

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages, and also to avoid the appearance of doing so, we are obliged to omit the name of the maker or the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago. [Editor.]

How the saw *cuts*



TRUE CUTTING is not all in the eye, nor fast cutting all in the hand.

Much—only the expert knows *how* much—is in the saw you buy.

Why, those even, little teeth in your saw actually do the work of tiny knives, chisels and planes.

When your saw—your Disston, for instance—is filed and set right, all these little cutters work together to make your saw cut true and fast.

But to give you a condition like that your blade must be the right kind of steel. And it must have been smithed and tempered by the hands of masters

to make it keep to the line and hold its edge.

So Henry Disston did something for saw-makers when he studied out all these requirements and met them in his saws. When he trained saw-makers. When he developed Disston Steel.

And the Disston Saw your dealer has ready for you, is even a better saw today. Its "hang" has been perfected. Its taper gives ideal balance as well as perfect clearance in the cut.

Use it once and you will know why it is "The Saw Most Carpenters Use". More—you will know it is the saw for you, yourself.

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DISSTON



The Telephone at the Centennial

ONE hundred years after the signing of the Declaration of Independence, the infant telephone was first exhibited at the Philadelphia Exposition.

Since the dawn of civilization, mankind had sought means of communicating over distances which unaided human speech could not bridge. Drums, signal fires, swift runners, the pony express, and finally the electric telegraph were means to get the message through. It remained for the telephone to convey a speaker's words and

tones over thousands of miles.

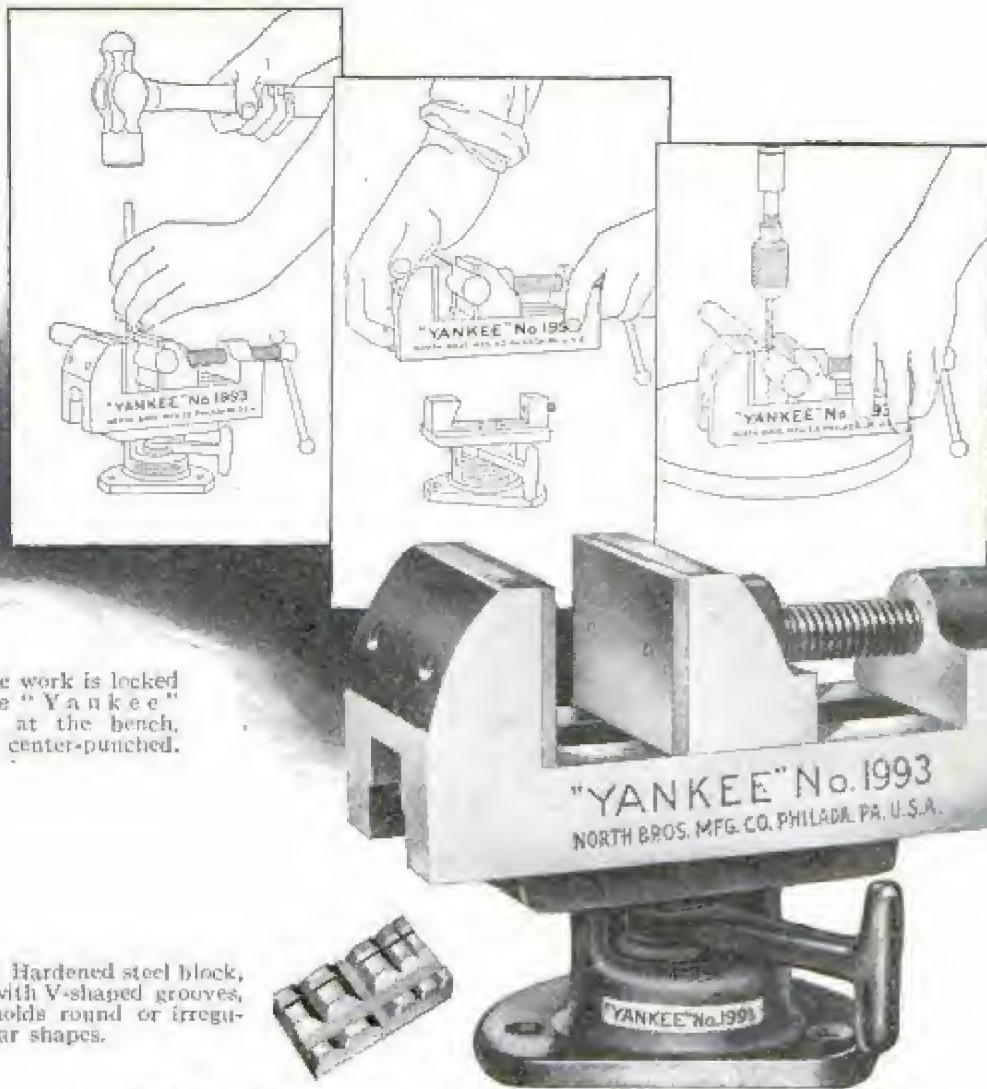
"My God, it talks!" exclaimed the Emperor of Brazil before a group of scientists at the Philadelphia Exposition, as he heard and understood the voice of Alexander Graham Bell, demonstrating the new invention.

Today, after a brief half-century, the telephone lines of the Bell System have become the nerves of the nation. The telephone connects citizen with citizen, city with city, state with state for the peace and prosperity of all.

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BELL  **SYSTEM**

IN ITS SEMI-CENTENNIAL YEAR THE BELL SYSTEM LOOKS FORWARD
TO CONTINUED PROGRESS IN TELEPHONE COMMUNICATION



The body of the "Yankee" Vise, with the work in it, is carried to the drill press.

The work is locked in the "Yankee" Vise, at the bench, and center-punched.

Hardened steel block, with V-shaped grooves, holds round or irregular shapes.

This means accuracy and faster work



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Some Other "Yankee" Tools

Ratchet Bit Braces. Ratchet Breast, Hand, Chain and Bench Drills. Ratchet Tap Wrenches. Spiral and Ratchet Screw-Drivers. Plain Screw-Drivers. Automatic Push Drills.

You buy and use "Yankee" Tools because they are different—and will work in ways and places in which no other tools will work.

The "Yankee" Vise is detachable from its base.

Sides, end, top and bottom, and the sliding jaw, are accurately machined to hold work square—with vise flat, on sides, or on end.

For many operations the "Yankee" Vise can be used as a jig. From machine to machine

it goes—the work kept in original alignment.

You can get the size most convenient for your work.

No. 1994—Jaws open 4 in.

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No. 1991—Jaws open 1 1/2 in.

The "Yankee" Vise has swivel base. Cam-throw lever locks vise in any position.

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Cut amply full for comfort and health. Finished perfectly—look at the buttons, for instance!

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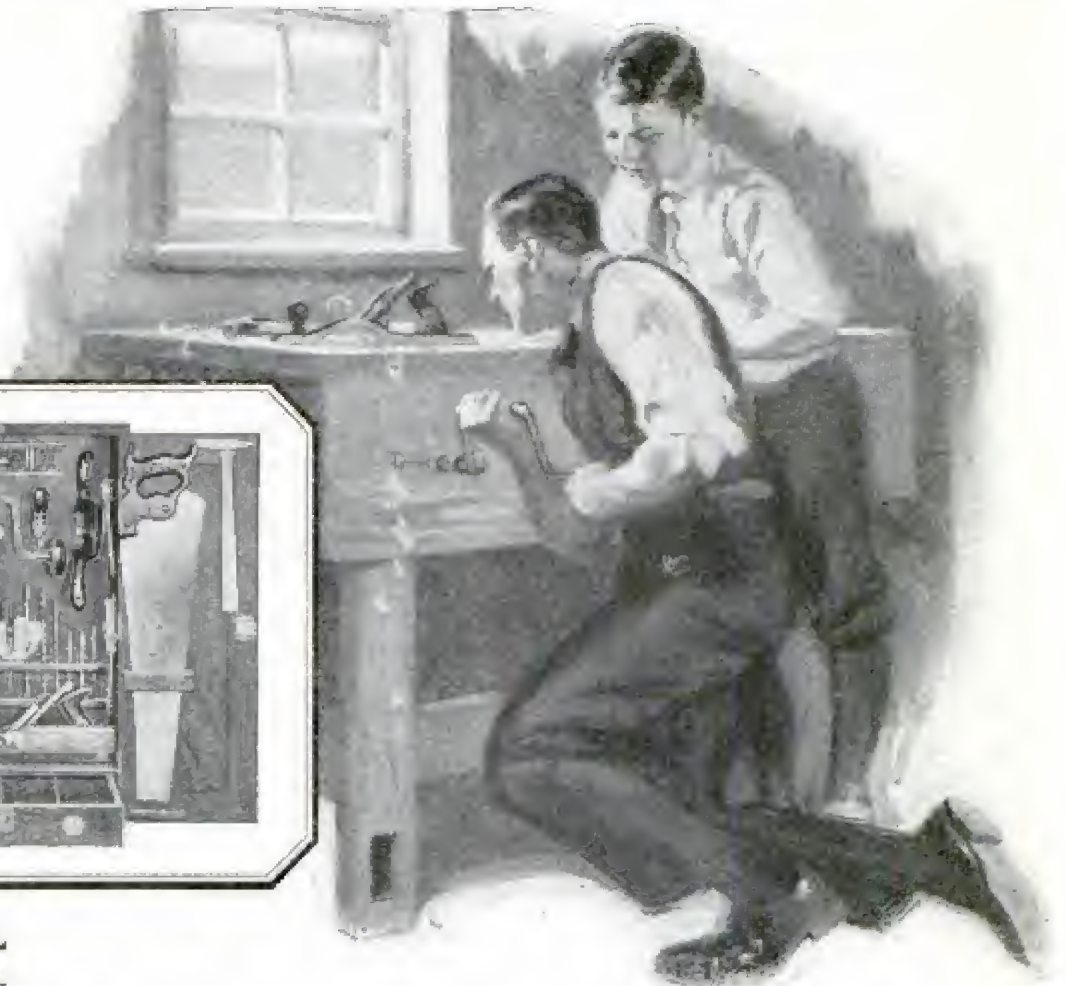
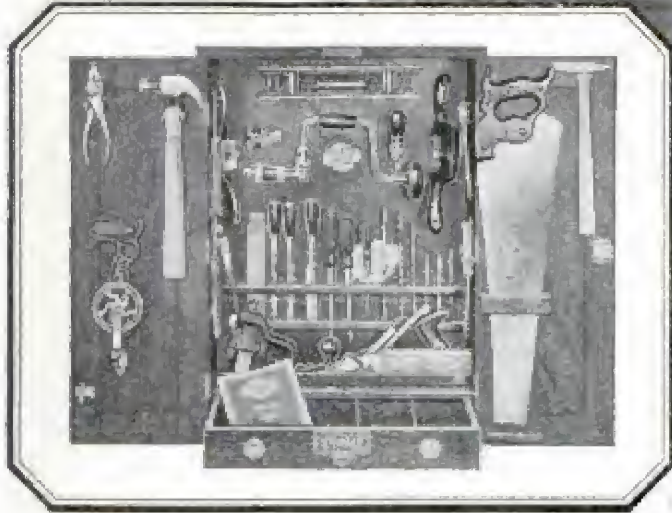
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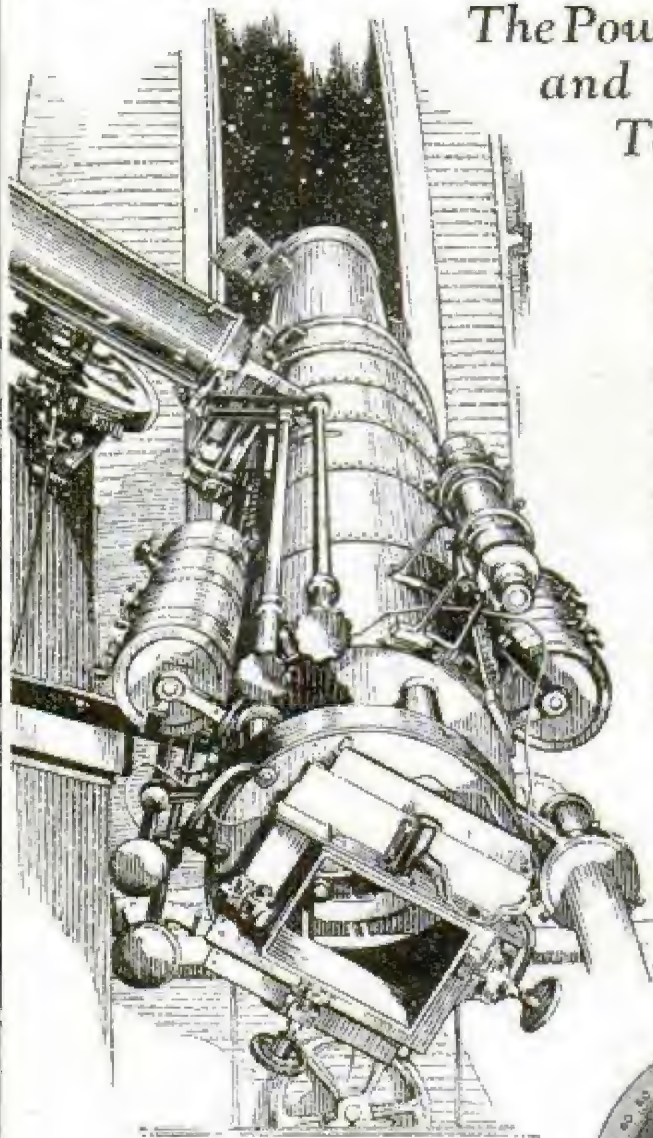
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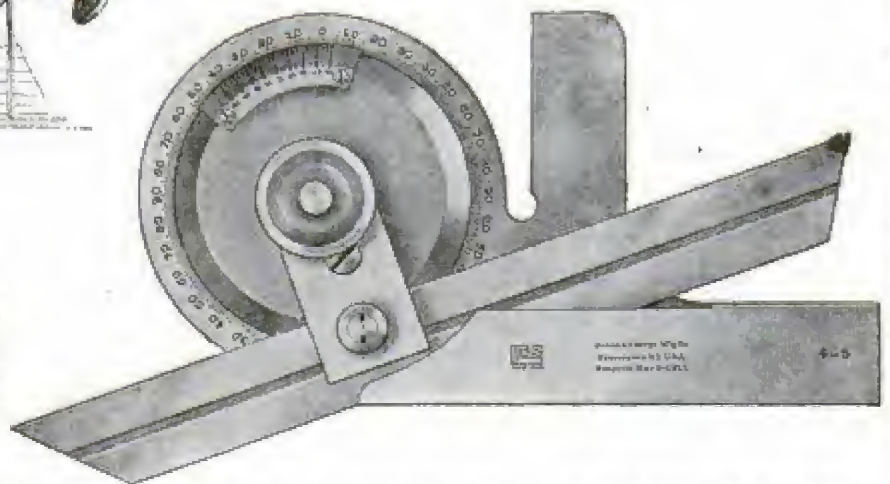


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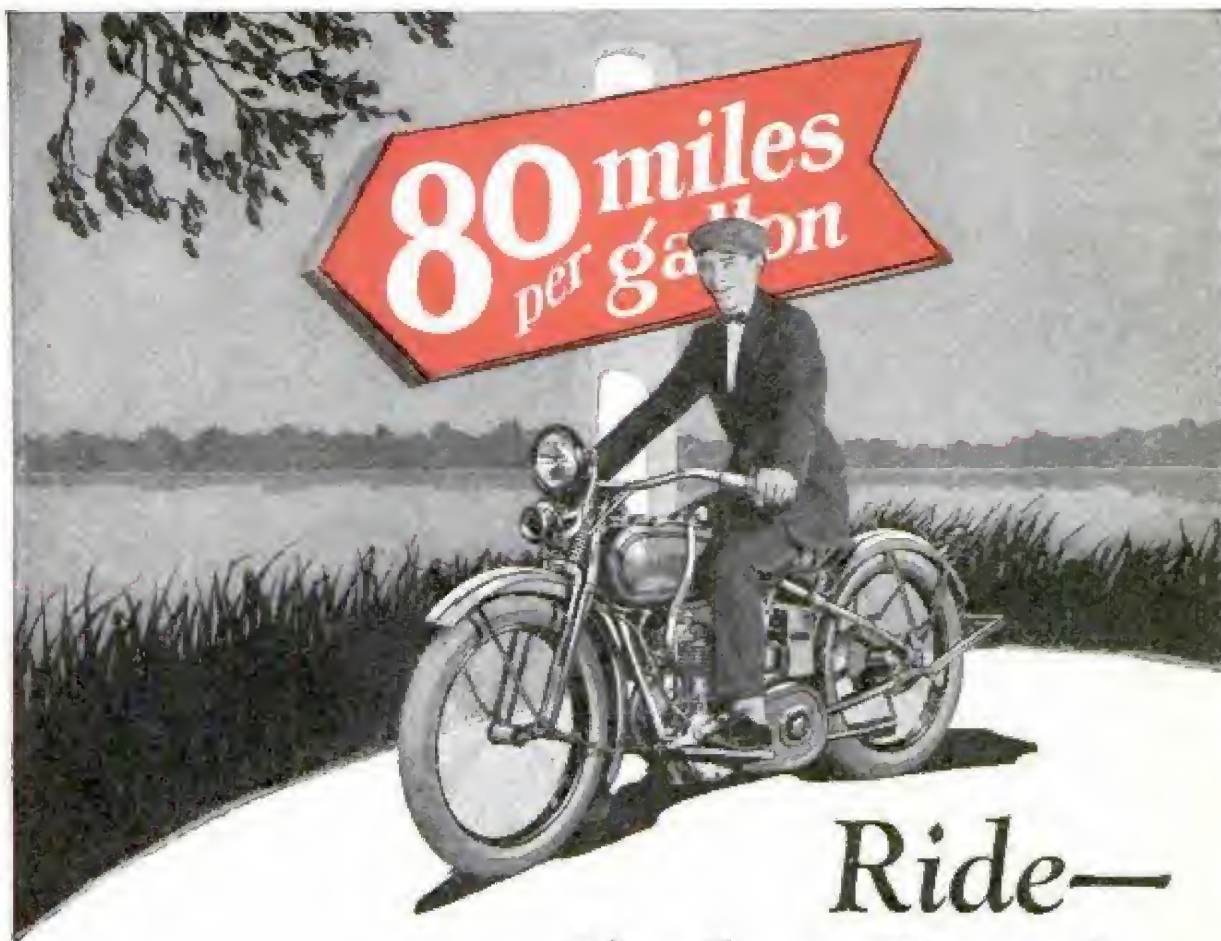
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NEW Ratchet Drill

Where you haven't room for the sweep of a brace, or the complete turn of the crank handle of an ordinary drill—this new ratchet drill simplifies boring. You know the sort of places—inside the furnace fire-box; close up to the wall or the radiator; into the cellar ceiling beams.

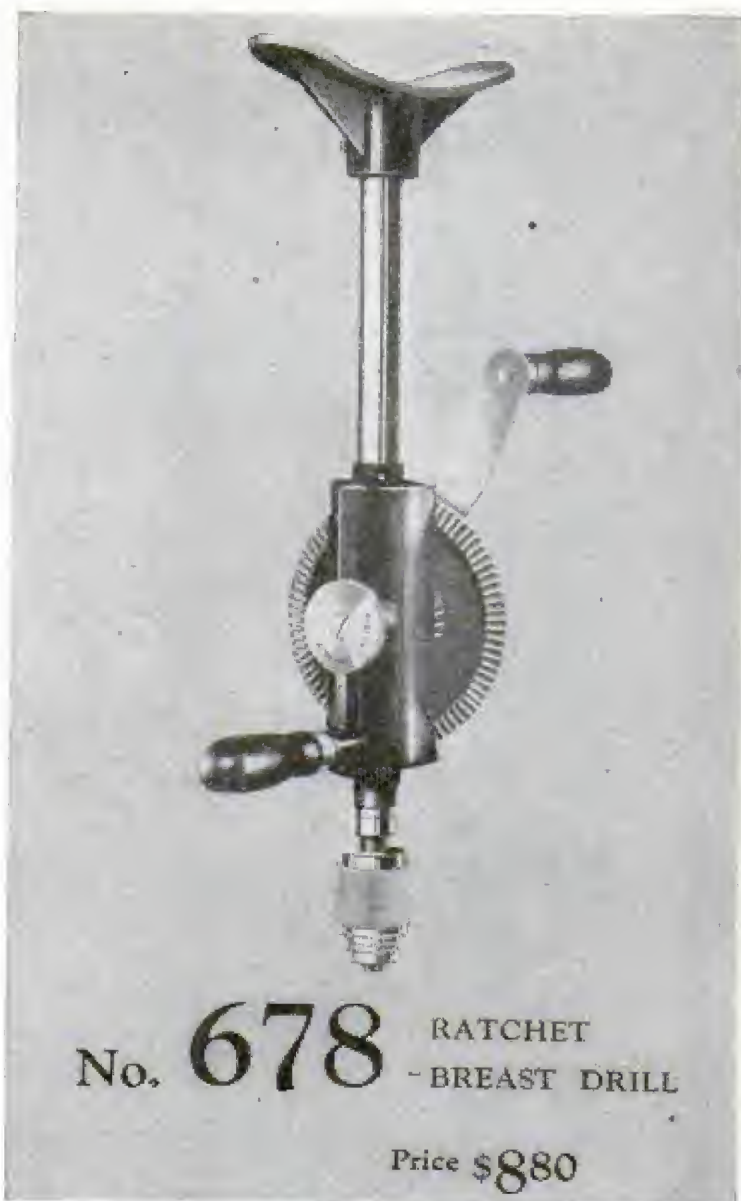
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The Aluminum Frame and Breastplate of No. 678 make this drill much lighter than you would expect, considering its size and capacity.

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SHANK of polished steel.	GEARS—have machine cut teeth.	HANDLES—of polished hardwood, mahogany finished.
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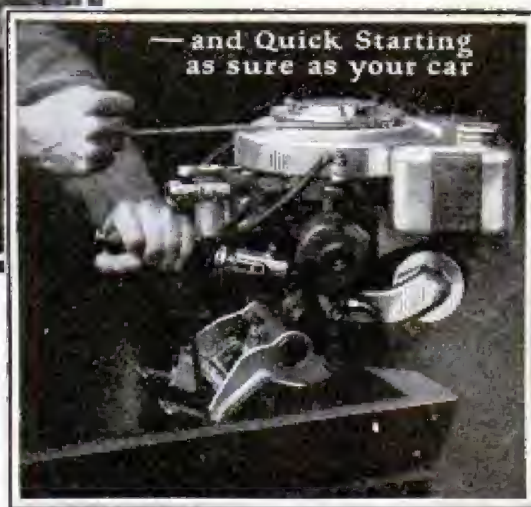
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AN INNOVATION in outboard motor equipment. Brilliant 6-volt light with thumb switch same as standard automobile equipment. Illuminates motor and boat.

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When motor is running magneto furnishes light current with no loss of intensity of spark plug current. When motor is stopped current for light is furnished by battery. This is one of the twelve latest refinements added to the New 1926 Champion Evinrude Sport Twin. Provides modern motor car conveniences never before included in outboard motor design.

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Sargent Planes are tools of the master craftsman, but so moderate in cost that they should be on every school and home-work bench. They are beautiful planes — in design, materials and finish. They are efficient in operation, simple in adjustment, so durable in construction that you may never have to replace them.

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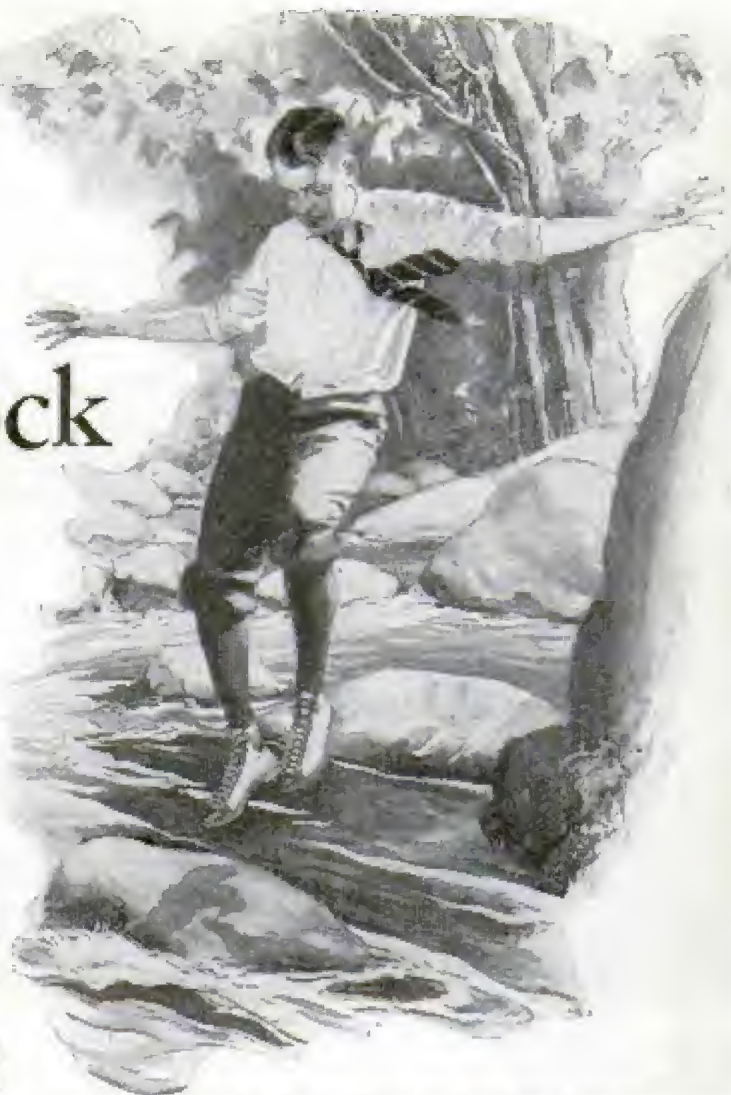
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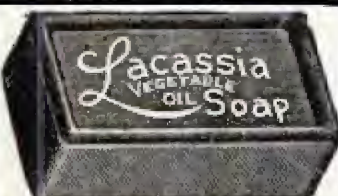
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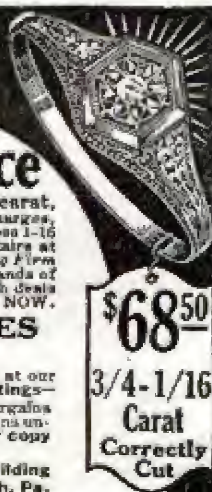
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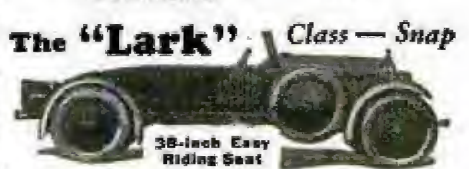
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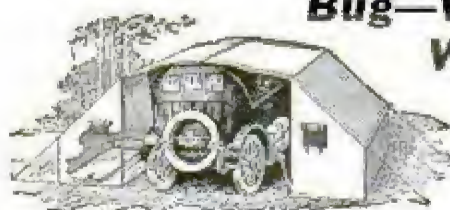
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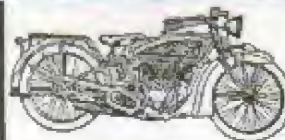


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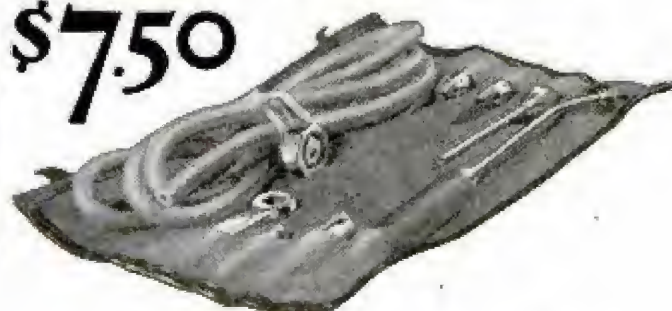
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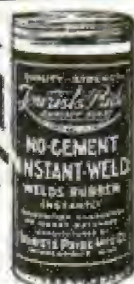
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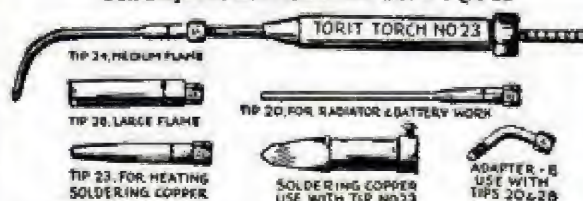
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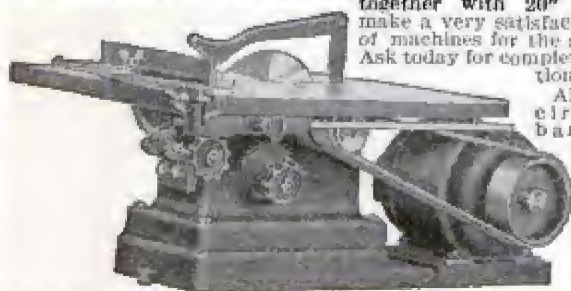
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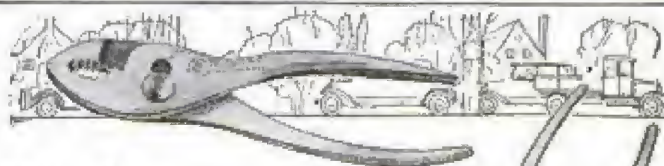
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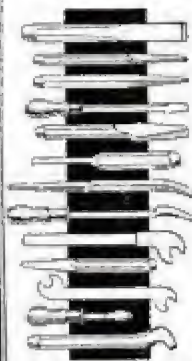
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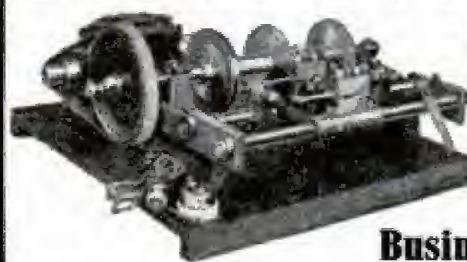
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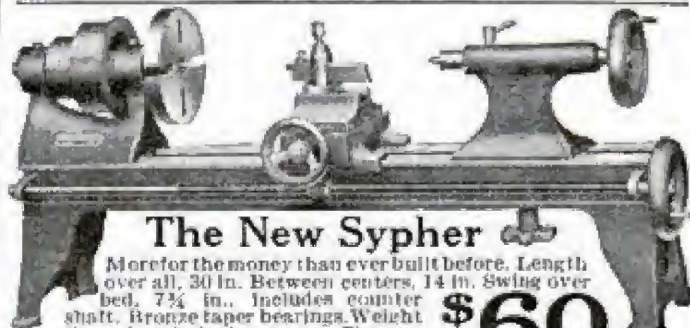
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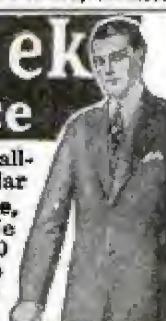
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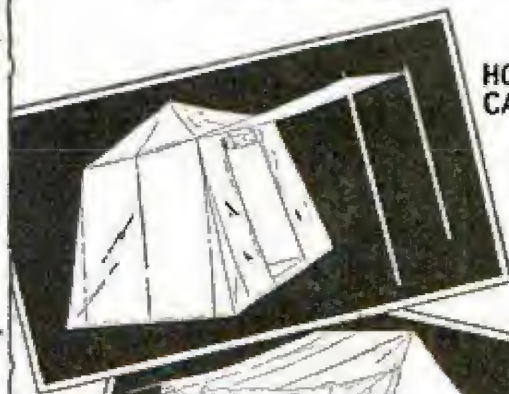
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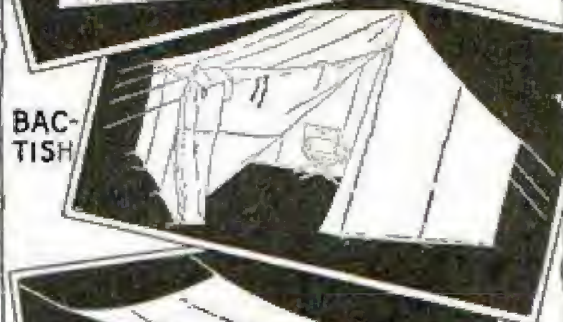
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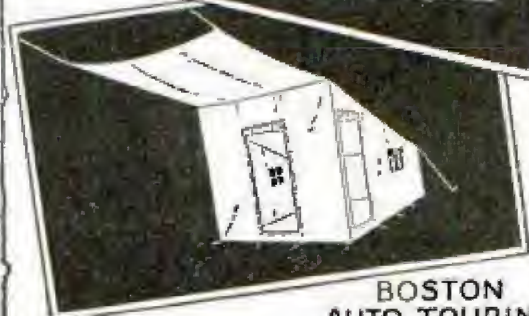
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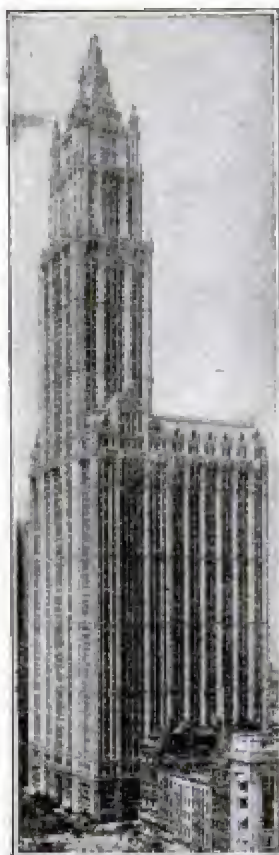
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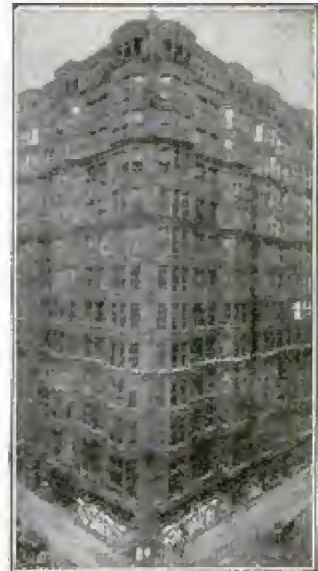
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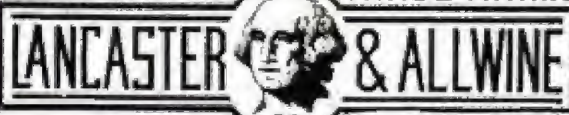


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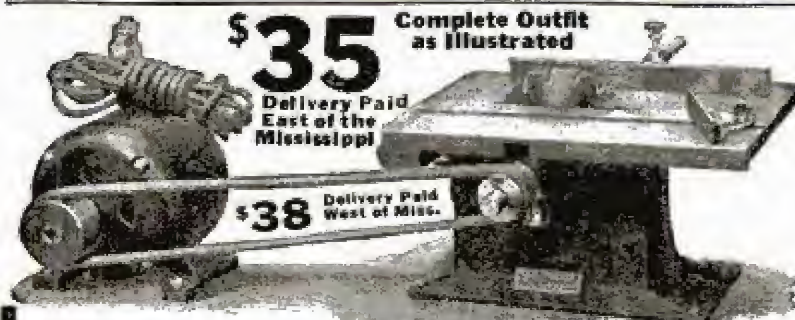
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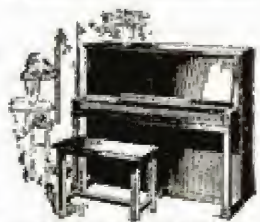
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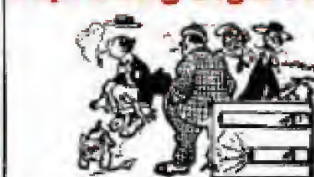
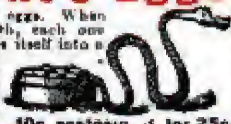
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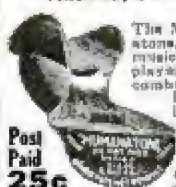
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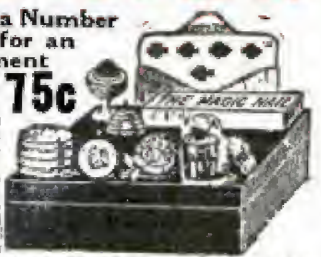


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A REAL STARTLER. This is the most popular of all squirt tricks. The flower in your coat looks so fresh and sweet that everyone is tempted to inhale the delightful perfume. Then is the moment to prove the truth of the advertisement. Don't they jump? There is a very hard rubber tube that easily reaches to the pocket of your coat or trousers, and the bulb is large enough to make a dozen snorts with one loading. PRICE 25c each, or 3 for 65c postpaid.

PISTOL, OPERA & FIELD GLASS

PRICE POSTPAID, \$1.00



It is made in the shape of and looks like a regular Automatic Pistol. No one is likely to stop and ask you whether it is real or not. Thus it is likely to prove itself very handy in an emergency. On pressing the trigger it opens up, shows in the illustration at the right, revealing nine wonderful articles: Opera and Field Glass, Telescope, Mirror, Magnifying Glass and Burning Lens, Reading Glass, Sun Dial, Sun Compass, etc. In the handle of the revolver there is a place for various pocket necessities, such as First Aid Articles, Buttons, Pins, etc. The Pistol is of sheet metal, blued finish, that can be carried comfortably in pocket. PRICE \$1.00.

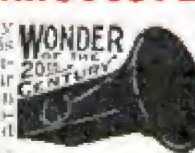
SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. PRICE 10c per box, 3 boxes for 25c postpaid, 12 for 75 cents.



SEEBACKROSCOPE

By merely placing this clever instrument to your eye, you can see what is going on behind your back, and sometimes you see very interesting things when no one thinks you are looking. Why it is just like having eyes at the back of your head. PRICE ONLY 25 cents, postpaid, 3 for 50 cents.



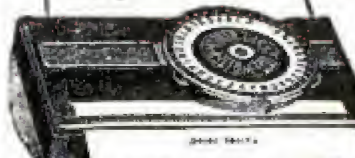
NEW BOOK ON ROPE SPLICING

A most practical handbook giving complete and simple directions for making all the most useful knots, litches, rigging, splices, etc. Over 100 illustrations. All about wire rope attachments, lashing, blocks, tackles, etc. 37 Heraldic Knots Illustrated. Of great value to mechanics, riggers, campers, boatmen. Price 20 cents postpaid.



The "Little Giant" Typewriter

A First Class Writing Machine For \$1.50



A perfect little typewriter for \$1.50. There are thousands of persons who would like to use a typewriter but whose need and business do not warrant the expense attached to the purchase and use of a fifty or seventy-five dollar machine. To such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it, and write as rapidly as they would with pen and ink. The letters of the alphabet most frequently used are so grouped or so made one to write rapidly, the numerals 1 to 10, and the punctuation marks being together. With this machine you can send your best girl typewriter love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With such typewriter we send a tube of ink and full printed instructions for using the machine. Price complete \$1.50 by mail postpaid to any address in the world.

JOHNSON SMITH & CO. Dept. 545 Racine, Wis.



Charge it!

Full Year to Pay
All transactions
strictly confidential
10 Days Free Trial

Don't pay now — just send your name and address and your choice comes to you parcel-post prepaid **on 10 Days Free Trial**. Pay postman only \$2 on delivery and then after free trial pay balance in 12 equal monthly payments.
Remarkable value—satisfaction guaranteed or your money back.

FREE

"Royal Book of Gems"

Thousands of special values in genuine diamonds, watches and jewelry illustrated. Your copy sent immediately on request.

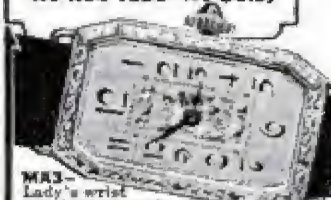
No Red Tape—No Delay

NO. MA1

\$72.50

**SEND
NO
MONEY**

**Look
Prosperous
Wear
Genuine
Diamonds!**



MA3— Lady's wrist watch latest style solid 14 K gold, highest grade 17 ruby and sapphire jewel movement. **\$22** lifetime guarantee. Featured at \$2 on delivery, balance \$1.67 month.



MA2— Beautifully band engraved wedding ring, 18 K white gold, with 6 genuine blue white diamonds — Feat. **\$29.50** featured at \$2 on delivery—balance \$2.30 month.



MA4— Fiery blue white diamond—best quality 18Kt. white gold—artistically carved, band pierced, lady's mounting. Featured at **\$49.50** \$2 on delivery—balance \$3.96 a month.



MA5— Three perfectly matched blue white diamonds set in a beautifully hand pierced mounting—18Kt. white gold—latest creation. Featured at **\$36.75** \$2 down—\$2.80 mo.



MA6— Something he will like and use. Famous Elgin strap watch, 20 year guaranteed green gold-filled case, radium dial—accurate time-keeper. Featured at **\$24.50** \$2 on delivery—balance \$1.86 per month. Established 1895

ROYAL DIAMOND & WATCH CO.
Address Dept. 1610 170 Broadway, N.Y.



**WIN
the Contest
with a
HOHNER!**

In the parks and playgrounds of the leading cities contests are now being held to determine the champion harmonica players. In each community some boy or girl will be the winner and enjoy the honors, rewards and opportunities that come with victory.

Get into the fun today and win the contest with a Hohner. Hohner Harmonicas have always been the leading favorites of leading players. They are true in tone, accurate in pitch and perfect in workmanship. Anyone can learn to play a Hohner with the aid of the Free Instruction Book. Ask your dealer for one today; if he is out of copies, write M. Hohner, Inc., Dept. 181, New York City.



Do Your PRINTING

Cards, stationery, circulars, labels, paper. Complete Outfits \$8.85 up, Rotary Jobber, \$150. Card Cutters \$3 Save Money. Print for others, big profit. Easy with rules sent. Write for catalog presses, type, paper, cards ink, etc. **THE PRESS CO., L-37, MERIDEN, CONN.**

**\$100 to \$125
PROFITS Weekly!**



New line of quality toilet goods sells like wildfire, 300% to 500% profits. No experience required. All you do is take orders from this beautiful sample case. Finest perfumes, soaps, facial creams, bath salts, face powders—wonderful products at prices that appeal to all women.

FREE Catalog

Just send your name and address. We send big catalog absolutely FREE. This money-making opportunity is unequalled.

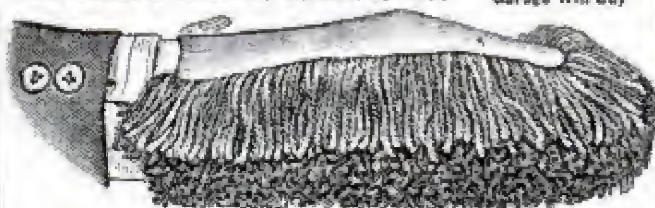
Be your own boss. Get paid every day. Write today—we show you how to make BIG money with little work.

THE NATIONAL SOAP & PERFUME CO.

512 W. Huron St. Dept. A-6 Chicago, Ill.

**AGENTS \$10. to \$25
DAILY!**

The Season's Greatest SELLING HIT Every Car Owner and Garage Will Buy



Fits the hand like a glove

AUTO MITTEN DUSTERS

Made from chemically treated yarn. Cleans, Dusts and Polishes. Agents are Cleaning up Big. A Mitten a Minute are common sales records. Over 200% Profit. Send for Free Sample Mitten and Sample Case Offer.

NATIONAL FIBRE BROOM CO., ST. LOUIS, MO.



SHAVE ELECTRICALLY!

You can't imagine how smooth and pleasant your morning shave can be until you try the new Vibro-Shave Electric Safety Razor. Its electrically operated blade, vibrating 7200 times a minute, is the secret of this new, scientific method of perfect shaving.

Send us \$10.00 today, and we will send you the complete outfit, including face and scalp massage attachments, five blades, cord and plug, attractively boxed. Shipments also made C. O. D. Your money refunded without question within five days if you are not satisfied.

For Use With 110 Volts Alternating Current Only

RAZOR PRODUCTS CORP.

1440 BROADWAY Dept. H
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Write for illustrated
circular



AGENTS WANTED!

Salesmen—Distributors

to use and introduce attachment that makes Fords run on 94% air. THERMOSTAT on exhaust automatically turns down needle valve as engine warms, exactly as Ford Manual says do by hand.

BLANCHE AUTO THERMO

An Automatic Carburetor Control

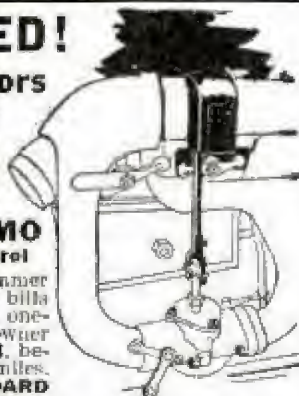
Makes Fords start easier winter or summer—saves half gas and oil—cuts repair bills one-half—reduces carbon formation one-half. Sells on sight to every Ford owner as easily as giving him a \$100.00 bill, because it saves \$100.00 every 10,000 miles.

CADILLAC NOW USES AS STANDARD

EQUIPMENT THERMOSTATIC CAR-

BURETOR CONTROL UNDER BLANCHE LICENSE. You can make Big Money selling this wonderful proven device. Experience not necessary. Blanche plan will start you without capital in a business of your own that makes you from \$250 to \$2500 a month profit. Write for free circulars Now!

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CHICAGO, ILLINOIS



Send 35c for an All-Work File to

FAYETTE R. PLUMB, Inc.

4817 James St.

PHILADELPHIA

ATKINSON AUTOMATIC TIMER SMALL BUT MIGHTY



Regulates firing of the spark according to the speed of engine. Makes easier starting, quicker get a way and smoother running at all speeds.

Short-Proof. Kick-Proof.

EVERY FORD NEEDS ONE

Distributors, Salesmen, Agents, Wanted. Can earn \$75.00 to \$100.00 weekly. A Wonderful Timer—a Wonderful opportunity for business. Write NOW for folder and confidential prices. Details for \$5.00.

Atkinson Automatic Timer Co., Cynthiana, Ky.



Your first shave

will prove, beyond all doubt,
the claims men make for this
unique shaving cream

Let us send you a 10-shave tube to try

WE'VE built Palmolive Shaving Cream to a national business success by making few claims for it. We let it prove its case by sending a 10-day test tube free to all who ask. In that way, we've gained leadership in a highly competitive field in only a few years.

130 formulas tried

Before offering Palmolive Shaving Cream, we asked 1000 men their supreme desires in a shaving cream. Then met them exactly.

We tried and discarded 130 formulas before finding the right one. We put our 60 years of soap experience behind this creation. The result is a shaving cream unlike any you have ever tried.

Five advantages

1. Multiplies itself in lather 250 times.
2. Softens the beard in one minute.
3. Maintains its creamy fullness for 10 minutes on the face.
4. Strong bubbles hold the hairs erect for cutting.
5. Fine after-effects due to palm and olive oil content.

Just send coupon

Your present method may suit you well. But still there may be a better one. This test may mean much to you in comfort. Send the coupon before you forget.

THE PALMOLIVE COMPANY (Del. Corp.),
CHICAGO, ILL.

10 SHAVES FREE and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Dept. B-1194, The Palmolive Company (Del. Corp.), 3702 Iron Street, Chicago, Ill.

Residents of Wisconsin should address The Palmolive Company (Wis. Corp.), Milwaukee, Wis.



KESTER READY TO USE METAL MENDER *The Household Solder*

Users Demand it for

Dairy Utensils
Milk Cans
Separator Parts
Funnels
Many similar uses

Kitchen Utensils
Pots and Pans
Wash Boilers
Tubs and Pails
Many similar uses

Home Uses
Rain Pipes
Copper Leads
Leaky Plumbing
Electric Wires
Many similar uses

Auto and Tractor
Radiator Repairs
Ignition Parts
Metal Bodies
Emergency Repairs
Many similar uses

KESTER Metal Mender is simple, safe, and sure; that's why users demand it! Here's what they say about it.

A Housewife says: "It is both economical and practical. I find it easy to use because it 'Requires Only Heat'."

A Mechanic reports: "I've been owning and operating a shop for 30 years and know what I am talking about when I say it is a first class article."

An Auto Owner said: "It met my needs for miscellaneous use around both the garage and household."

The Home Owner says: "The uses I have put it to prove its efficiency for home use."

Glance over the opposite list. See how much you need Kester Metal Mender right now—the solder carrying its own flux.

**Extracts from many letters on file.*



ANY LIVE DEALER CAN SUPPLY YOU

**FREE Sample
Upon Request**

CHICAGO SOLDER COMPANY

4201.331 Wrightwood Ave., Chicago, U. S. A.

Originators and World's Largest Manufacturers of Self Fluxing Solder

BOYS Look, Movie Machines

for the family sell as low as **\$7.50**
We carry WESTERN and COMEDY FILMS only.
Write now for free catalogue on machines and films.

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Used and Rebuilt Indian, Harley-Davidson, Ace, Henderson and Cleveland motorcycles at a saving of 50%. Send for our latest list.

"Motorcycles shipped to all parts of the world."

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WADE BENCH LATHE

AMATEUR MECHANICS, REPAIR SHOPS, INVENTORS, STUDENTS

A real machine tool for the home work bench—capacity 4" dia. x 12" length. For Metal—Wood—Composition Materials—Turning—Facing—Boring—Drilling—Winding—Thread Cutting—Accurate—Strong—Quiet—Compact. Slide-rest has travel entire length of bed. Leadscrew inside bed. No. 1 Lathe, plain headstock, \$28.00. No. 2 Lathe, back-gear headstock, \$55.00. Complete line of accessories at equally low prices. Write for free catalog.

THE GEROLD CO., Dept. P-23, 120 Liberty St., New York



The Finest Sport in the World-

YES—the greatest sport of all! And so easy, so inexpensive to enjoy! With a rowboat and the Super Elto you have an open sesame to the world of bright sunshine and sparkling waters—of fishing, cruising, racing and every form of water recreation. That's the splendid new sport of outboard motor boating.

More power! New features! Same low price! The Super Elto is a history-making value. Do you want speed? Here is surpassing speed! Power? Here is $\frac{1}{2}$ more power and no increased weight! Easy Starting? Here is the only quarter turn starter. Instant starting! And dependability! And compact portability!

Send for Catalog! A real guide to motor value. Beautifully illustrated, intensely interesting. Write today.

ELTO OUTBOARD MOTOR COMPANY
Ole Evinrude, President
Dept. AA Mfr's Home Bldg., Milwaukee, Wis.

Super Elto



\$25.00 a DAY-CLEAR

SURFACING FLOORS

Write Quick for Details

Scores of inexperienced men whom we started as American Universal Floor Surfacing Contractors are making up to \$10,000 a year in this wonderful, new, uncrowded field. Electrically driven American Universal Machines do 500% more work and 100% better work than most expert hand scraper, and earn six men's pay. Work is plentiful, fascinating, immensely profitable. Experience unnecessary. Small amount starts you. We furnish everything, teach you, help you succeed. Opportunity of lifetime to be your own boss and make big money.

AMERICAN FLOOR SURFACING MACHINE CO.
523 So. St. Clair St. TOLEDO, OHIO

NEW MARVELOUS ONE - MINUTE CAMERA

Takes and finishes pictures inside the camera in one minute. Agents wanted. Exclusive Territory. Make money selling these wonderful cameras or taking photos or both. Six different models. Photos 4x6, 3 1/2x5 1/2, 3x4 1/2, 2 1/2x3 1/2, 2x3 and 1 1/2x2 1/4 inches. No experience necessary. Any one can operate these cameras. Write today for special offer.

CROWN MINUTE CAMERA COMPANY, Dept. 301, NORWALK, CONN.



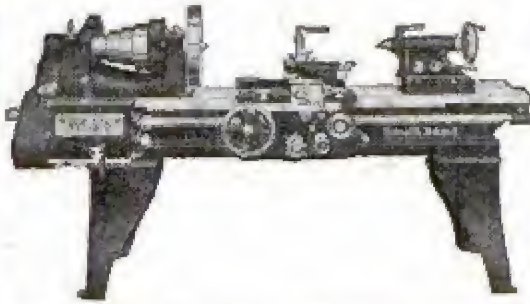
Lighting Fixtures READY TO HANG

(Direct from the Manufacturer)

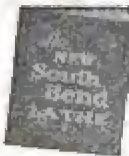
Completely wired, including glassware. Send for New Catalogue No. 27. Just reduced prices.

Special proposition to DEALERS.

ERIE FIXTURE SUPPLY CO.
STA. A ERIE, PA.



18 inch x 10 foot Quick Change Gear
Screw Cutting Lathe, \$746



Write for this Catalog

Shows 96 styles and sizes of Lathes, Motor Driven Lathes, Gap Lathes, Bench Lathes and Attachments.

The New South Bend Lathe

A heavier, stronger Lathe of greater belt power—and many other improvements make this a very attractive and unusual lathe value.

Easy Payments if Desired

TERMS: A 20% cash payment with order—the balance in 10 monthly payments. Write for the new South Bend Catalog No. 86.

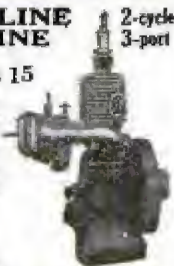
Factory Prices
Quick Change
Gear Lathes
9x3 ft. \$258
11x4 ft. \$308
13x5 ft. \$387
15x6 ft. \$468
16x8 ft. \$553
18x10 ft. 746

South Bend Lathe Works
810 East Madison St., South Bend, Ind.

THE WOTEN GASOLINE ENGINE

Air-cooled—Water-cooled. One-half H. P. in 15 pounds. Handiest little engine ever made. Ideal wherever power is needed. Also the Metalum Model Airplane Engine, one-half H. P. in 3 1/4 pounds. The market demands them in thousands. Generous agency propositions on request. Complete line of small gasoline and steam engines, battery chargers, etc. Catalogue Free.

DYNAMIC MANUFACTURING CO.
First Nat'l Bank Bldg., Dept. 7, CHICAGO



New Invention

DOES AWAY WITH PHONOGRAPH NEEDLES Abolishes Scratching—Saves Records

Saves time and annoyance—Saves \$25 in needles! Sells for \$2. Mrs. Ellis says "Sold 7 EVERPLAYS in 45 min." Complete sales outfit with regular gold-plated \$2 EVERPLAY and instructions for special price of \$1. No room to tell our story here. Write today!

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SPEED WAY SHOP

Six Complete Motor Driven Tools

A compact metal and woodworking outfit for mechanics, householders and "handy" men. Attaches to lamp socket.

Only \$10 Down—Easy Payments

Every tool in the "Shop" is highgrade, for regular work. A money maker for the small job man. Get full particulars. Write today.

Electro-Magnetic Tool Company

DEPARTMENT 26

1830 South 52nd Ave., Cicero, Illinois (Adjoining Chicago)

FREE

1000
Illustrations

**ELECTRIC
FIXTURE CATALOG!**

Write today for your copy. Save 50% direct from Manufacturer. No Middleman's Profit. OUR SPECIAL: 8 Room Electric Set, ready to hang, \$24.50—Other bargains.

UNITED LIGHTING FIXTURE CO.
83 Flatbush Ave. Dept. P, Brooklyn, N. Y.



Heats 7 Rooms at about the Cost of One!

"With the Bulldog Furnace, we find it takes little more coal to heat the whole seven room house than it did to heat one room with a stove using chestnut coal." J. B. Smith, 18 Elm St., Somerville, N. J.

More Heat with Half the Coal

"I had a hot air furnace in our house before I got the Bulldog and our 7-room house was always cold. With the Bulldog it only takes half as much coal and we had weather below zero, and the house was nice and warm in the morning when we got up. We never have the draft on more than a half hour at a time, and it has the place red hot." Jess. T. Conrad, Shamokin, Pa.



If you are even thinking of a pipeless furnace, or any furnace, write for our free catalog. The Bulldog is one furnace you MUST investigate. Comes completely erected. Fits any height of basement and you install it yourself.

No Money Down

The Bulldog is sent for free inspection

Then, if satisfied, you make only small monthly payments at our amazingly low price. Factory connections in both East and West. We ship from nearest point. Don't consider buying any furnace until you find out about the Bulldog. Write at once for our special offer and our free catalog together with the wonderful record of Bulldog success. Mail this coupon today.

Babson Bros.

19th and California Ave., Dept. A-135, Chicago

Without obligating me in any way please send me your free catalog and special offer on the Bulldog Pipeless Furnace.

Name

Address

Fat Men

This new self-massaging belt not only makes you look thinner INSTANTLY—but quickly takes off rolls of excess fat.

DIET is weakening—drugs are dangerous—strenuous reducing exercises are liable to strain your heart. The only safe method of reducing is massage. This method sets up a vigorous circulation that seems to melt away surplus fat. The Weil Reducing Belt, made of special reducing rubber, produces exactly the same results as a skilled masseur, only quicker and cheaper.

Every move you make causes the Weil Belt to gently massage your abdomen. Results are rapid because this belt works for you every second.

Fat Replaced by Normal Tissue

From 4 to 6 inches of flabby fat usually vanishes in a few weeks. Only solid, normal tissue remains. The Weil Reducing Belt is endorsed by physicians because it not only takes off fat, but corrects stomach disorders, constipation, backache, shortness of breath and puts sagging internal organs back in place.

Special 10-day Trial Offer

Send no money. Write for detailed description and testimonials from delighted users. If you write at once, you will receive a special 10-day trial offer. The Weil Company, 96 Hill Street, New Haven, Conn.



THE WEIL COMPANY, 96 Hill St., New Haven, Conn.

Gentlemen: Please send me complete description of the Weil Scientific Reducing Belt, and also your Special 10-day Trial Offer.

Name


Address

City..... State.....

HAVE YOU SEEN THE Wonderful New Spot Cleaner NO OTHER LIKE IT

"Speed for Spots"—the little cleaning plant in a bottle! No rags, no rings, no danger. Simply tip the bottle, rub the "spot" and it's gone for good. Agents make big money. One demonstration sells. Sold with money back guarantee, 50c retailer. Sample 25 cents. Send for yours, with sales outfit free today. Speed Cleaner Co., Dept. P. M., 8 E. Lake St., Chicago, Ill.





Clear-Tone FOR PIMPLES

Your skin can be quickly cleared of Pimples, Blackheads, Acne or any Eruptions on the face or body, Barbers Itch and Eczema. Enlarged Pores, Oily or Shiny Skin. CLEAR-TONE has been Tried, Tested and Proven its merits in over 100,000 test cases.

FREE

WRITE TODAY for my FREE Booklet —"A CLEAR-TONE SKIN" telling how I cured myself after being afflicted for fifteen years.

E. S. GIVENS 129 Chemical Bldg. Kansas City, Mo.

\$15 to \$25 A DAY EASY SELLING WORLDS FASTEST MONEY MAKER

Now you can carry a little device in your pocket that will often make you 60c a minute. Simply show it and sell it!



HOT SPOT ELECTRIC CIGAR LIGHTER for Any AUTO \$1 or RADIO . . . 1

MILLIONS of motorists and millions of radio fans just waiting for this great convenience. Nine out of ten buy quick at only \$1.

Your profit, 60c. Agents selling 30 to 60 a day—\$18 to \$36 profit! Sell autos or homes, anywhere or anytime. Easiest, fastest seller ever seen! Positively anyone can make \$18 to \$36 a day.

Test it free. Send \$1 deposit for demonstrator. See how fast it sells. You risk nothing. Deposit refunded if you return Hot Spot in 15 days or on your first order, giving you demonstrator free. If you prefer, send only name and address for facts. But hurry. Do one or the other. Don't miss this amazing chance to make \$200 a week.

PREMIER ELECTRIC CO.

Dept. G-506

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Delivered to You Free

for 30 days trial on approval. You can have your choice of 44 Styles, colors and sizes of the famous **RANGER Bicycles**. Express prepaid. **Factory-to-Rider** Prices save you \$18 to \$25 on your bicycle.

\$5 a Month if desired. Many boys and girls easily have the small monthly payments. Parents often advance first payment.

Tires best quality, at factory prices, express prepaid. Lamps, wheels and equipment, low prices. Send **No Money**, do business direct with makers.

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Write today for free Ranger Catalog, factory prices and marvelous easy payment terms



MAKES \$18.08 In Few Hours

Without experience E. Lube earned \$18.08 in one afternoon with our beautiful dress goods, silks and wash fabrics. No capital needed. We show you how to succeed. Write for samples and complete selling instructions.

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MOVIES IN YOUR HOME

Practical Movie Machines in many wonderful models, some as low as \$3.75 and use same size film as big theatres. Fine films at lowest prices with a film exchange service. Many biblical films. Write for free illustrated catalog.

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Dept. MB, 120 High Street, Boston, Mass.



DARCHE "CALL-ME" ELECTRIC ALARM AND LIGHT CLOCK

Waking until you get up and STOP it. No home complete without one. Can be used as an "alarm clock" or "mantel clock." With a little effort on your part you can get one.

FREE OUR OFFER TELLS YOU HOW

Agents, here is a big money-maker, no competition, sells on sight. A good punch board proposition. Write today for our descriptive literature. An ideal GIFT for any occasion. Mahogany finish. Size 10½ x 8½ x 4. Tolls applies to U. S. only. Darche Mfg. Co., 645 Washington Blvd., Chicago

\$542⁰⁰ Earned IN ONE MONTH

A BIG MONEY - MAKING BUSINESS

A BUSINESS TO ENTHUSE OVER — THE "IDEAL" LAWN MOWER SHARPENER

A wonderful invention that sharpens lawn mowers scientifically—quickly—perfectly; does the work as nothing else can.

Fred C. Milkert, of Roselle, Ill., writes: "The Ideal Lawnmower Sharpener put me in business, starting in the basement of my home and forcing me now for the third time to move into bigger quarters. Today the dream of my life—a shop of my own—is realized. With a machine like yours and a little hustle any man can have a business of his own and be independent."

W. F. Kendt, Buffalo, writes: "I sharpened 994 lawnmowers last season, and the receipts were nearly \$2,100.00 which is not bad for a side line."

You Start Now No town too small. **D. S. Newcomer, Vinton, Iowa, writes:** "People come for miles around and from other towns to get their mowers ground."

Lawn mowers are dull—owners don't know where to get them sharpened. Mowing the lawn dreaded because of dull or improperly sharpened mower. Lawn mowing healthful, invigorating and pleasant when mower is "Ideally" sharpened. You do the work scientifically—you are in big demand.

Lawn Mowers Sharpened to Razor Edge—

People glad—owners delight in mowing lawn with mower sharpened on an "Ideal." Mower runs light—click-click-click and the grass is cut. Build permanent business for yourself. Start now!

Write Today—FREE

Detailed illustrated catalog and booklet "Let George Say It."

Write Today!

The Fate-Root-Heath Company
818-844 Bell St., Plymouth, Ohio

USE THIS—Mail It Today

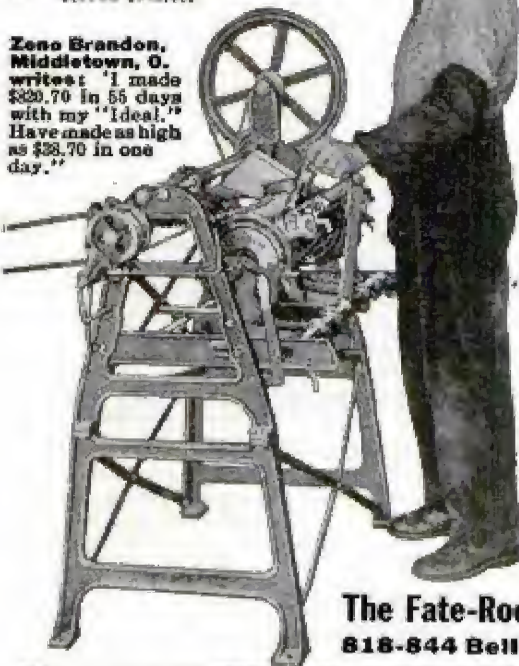
The Fate-Root-Heath Company
818-844 Bell Street, Plymouth, Ohio

Please mail at once free Illustrated Catalog and booklet "Let George Say It."

Name _____

Address _____

Zeno Brandon, Middletown, O., writes: "I made \$320.70 in 55 days with my 'Ideal.' Have made as high as \$38.70 in one day."



GET YOUR SLICE OF BIG PROFITS

with this amazing new



DOUBLE EDGED RAZOR BLADE PARING KNIFE

The fastest selling home necessity ever offered. Sells for 25c.

Your price \$1.50 dozen, prepaid. Guaranteed.

MORGAN MANUFACTURING CO., 440 S. Dearborn St., Dept. G, Chicago

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Our net price list. Full line of auto bodies and accessories for Fords at Wholesale Prices. Save big money on bodies by buying Direct from Factory.

FOR FORD—Prices from \$27.85 up. Factory to consumer direct—Pay Only One Profit.

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Interlox

MASTER SLIDE RULE
Takes accurate inside or outside measurements

MASTER RULE MFG. CO., 813 E. 136th St., NEW YORK

Works fast. Slides in and out quickly. Durable made of brass trimmed boxwood. Any length 2 to 8 feet. Ask your dealer

Dealers and Agents request attractive proposition

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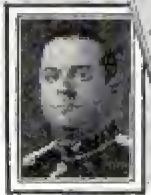
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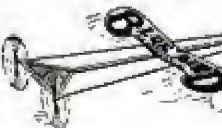
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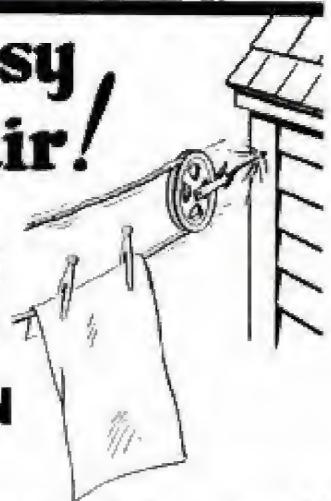
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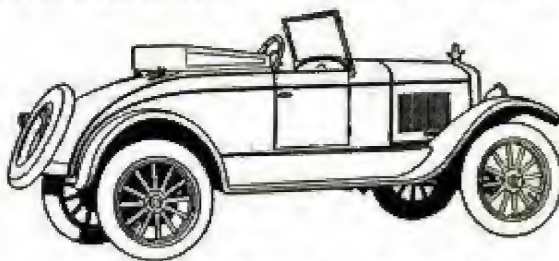
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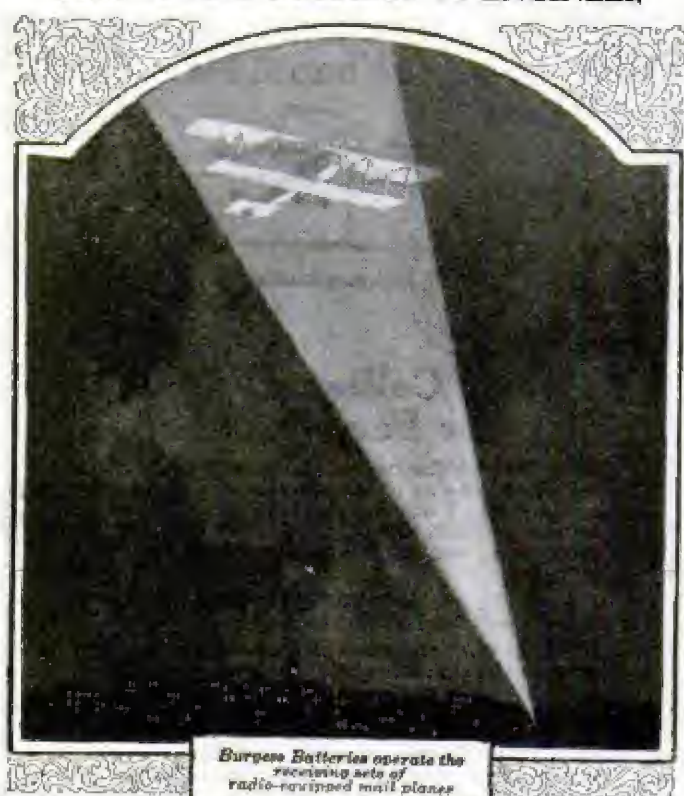
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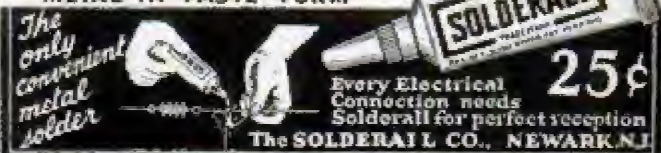
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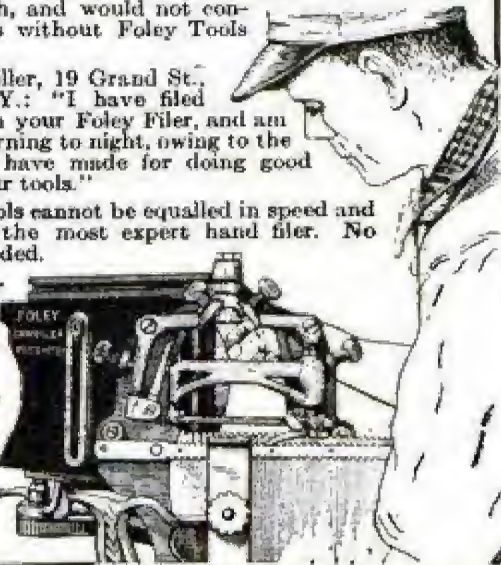
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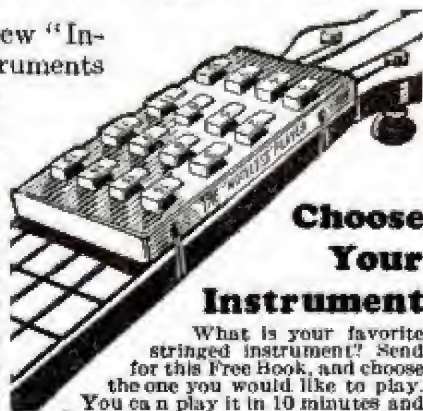
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Repair burnt-out Radio Tubes. Guaranteed simple process; small cost. Instructions \$1.00. **DUCK MFG. CO., Dept. M, FREEPORT, ILLINOIS**

Good Sockets Are Important!



One experience will change the belief that it is economy to use inferior sockets. For best results you can do no better than choose B-T Sockets. They take both the old and new base tubes without an adapter.

Price type UL Socket **75c**

Each.....

Silent Socket (for Detector) **\$1.25**

Each.....

The B-T **PUSH TYPE** Socket for those who want a less expensive socket. The compact size and sound design will appeal to many.

SEND FOR FREE CIRCULARS ON ALL B-T PARTS

BREMER-TULLY MFG. CO. 532 S. Canal St. Chicago, Illinois.

ACCUSTI-CONE SPEAKER



FROM FACTORY TO YOU
FULL SIZE 19 INCH CONE

Powerful unit, would cost \$25 in a store, SAVE BY GETTING IT DIRECT FOR Guaranteed superior to any speaker at any price. Shipped on receipt of price. Money back guarantee.

7.50

ACCUSTICONE LABORATORIES
96 Church Street, NEW YORK, N. Y.

FREE RADIO CATALOG



Just off the press! Our second catalog for 1926. 100 pages of parts, accessories, kits and sets—all the best and the latest. A copy is yours for the asking. Just drop us a line—do it today!

DEPT. PM

CHICAGO SALVAGE STOCK STORES

509 S. State Street CHICAGO, U. S. A.

DAVEN



LEAKANDENSER

Grid resistor and grid condenser in one. Space-saving. Moisture-proof—accurate—permanent. A radio product of true Daven quality. Ask your dealer.

DAVEN RADIO CORPORATION

165 Summit St.

NEWARK, N. J.

HUNDREDS OF USES FOR

TURNER BLOWTORCH

Safe as a Candle

MASTER No. 45

When you know, as most mechanics do, the great variety and range of uses you have for this efficient heat maker, you'll keep one on hand for instant service. Perfectly controlled and adjusted flame of 400° greater heat with present day fuel; never blows out; seamless brass tank with only one opening; comfort grip; are but a few of the superior features of Turner Master 45 Blowtorch. Fearlessly guaranteed. Ask your dealer for a Turner 45 or write us direct.

THE TURNER BRASSWORKS

Industry Ave. Sycamore, Ill.



\$8.25

Postpaid

Double Heavy Double Keen



Good News ~ for bad-blade sufferers!

DOUBLE-QUICK, double pleasant shaves, are guaranteed for the new Gem Double Life Blade.

A single-edge—double-keen!—double-durable! A blade of double-heavy, double-hard steel—double-rigidity.

The Gem is guaranteed to double your shave-pleasure. Try it.

Gem Double Life Blades come double-protected and double-sealed.

Sold everywhere.

P. S.—Your money does double duty when it buys a Gem de Luxe Razor.

GEM SAFETY RAZOR CORPORATION
Brooklyn, N. Y.

GEM

Double Life BLADES





OIL HEAT

THE HI-LO OIL BURNER in your heating plant (Hot Water, Steam or Hot Air) will automatically and economically maintain the desired temperature under all weather conditions. The simplest, most efficient yet lowest priced Oil Burner in the field.

Responsible Distributors Wanted.

Gloria Light Co., 111 N. May St., Chicago

House Plans Free

Plans and pictures of 25 one and two story dream homes. Porches, closets where you want them. Vestibules, breakfast alcoves. Everything planned for comfort and convenience. Expert advice on new way to build at big saving.

WRITE FOR BOOK

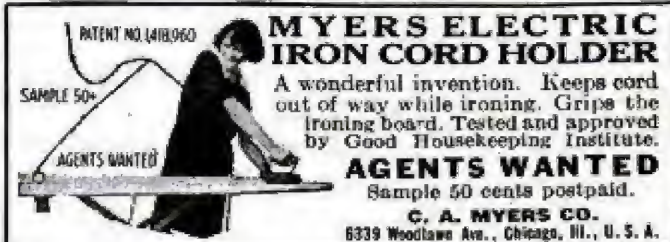
Learn how you can build your home at wholesale. Buy direct. 30 per cent less on material—40 per cent less on labor cost. Complete material for this beautiful home cut to size—ready to erect for \$915—is good illustration of amazing savings actually available to you. Others at \$373 to \$1375 with freight prepaid to all points east of Mississippi and north of Mason and Dixon line. Write for free book today—see with your own eyes how to build the home of your dreams and save from \$200 to \$1500. No obligation.

LIBERTY HOMES CO.
Dept. 12-G Bay City, Michigan

LAFAYETTE
Six rooms,
two closets,
bath, hall—

\$915.00

Save money when you build



PATENT NO. 1,418,060

MYERS ELECTRIC IRON CORD HOLDER

A wonderful invention. Keeps cord out of way while ironing. Grips the ironing board. Tested and approved by Good Housekeeping Institute.

AGENTS WANTED
Sample 50 cents postpaid.

C. A. MYERS CO.
6339 Woodlawn Ave., Chicago, Ill., U. S. A.

SMALLEST BIBLE ON EARTH—illustrated—size of a postage stamp. A perfect gem. A work of art. Carry one in your pocket or purse. Thought by many to bring good luck to the owner. Sample send for 10 cents (silver).

NOVELTY SPECIALTIES SERVICE
A. B.—268 Market St., San Francisco, Calif

10c

RADIO

LATEST CATALOG OF NEWEST PARTS AND KITS

Fresh from the press. Shows all the newest standard parts and kits at big savings. Most complete line in America. Send name and address, also name of friend. Send at once.

FREE

BARAWIK COMPANY, 102-168 So. Canal St., CHICAGO, ILL.

FROST-RADIO

Here is the new **FROST-RADIO**
Metal Frame
Rheostat

List 50c

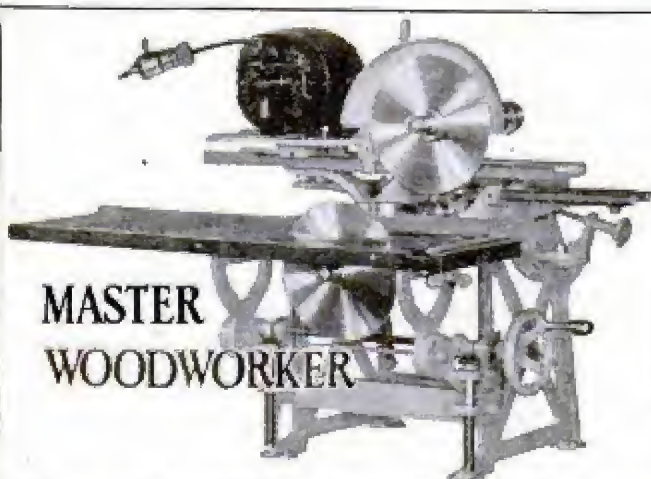
Not only new and radically different, but infinitely better! Sturdy one piece nickel plated frame insures precision operation and smooth, non-wearing action. As



Illustration is actual size

frame cannot warp or bend, shaft alignment is permanent. Bakelite pointer knob; tinned soldering lugs; 2, 4, 6, 10, 15, 20, 25, 30 and 35 ohm types 50c, 200—400 ohm potentiometer, 65c. A remarkable achievement. Ask your dealer about the new **FROST-RADIO** Bakelite Rheostat.

HERBERT H. FROST, Inc.
314-324 WEST SUPERIOR ST., CHICAGO, ILL.
New York City Cleveland Kansas City
Los Angeles



MASTER WOODWORKER

**Complete Woodworking Shop—
Small Cost—
Easy Payments**

A great opportunity for you to get a complete wood working machine for home use, factory or construction use.

The "Master" is 12 machines in one. It does cross cutting, ripping, jointing, boring, sanding, dadoing, planing, plowing, mitering, rabbeting, molding, band sawing, mortising, tenoning, grinding, matching and stair routing.

Wonderfully speedy and accurate—sturdy and reliable. Lasts a life time—runs from a lamp socket.

Model No. 10 illustrated, rips 1" stock, cross cuts 2" stock. Three larger models for heavier work.

Costs little—sold on easy payments.

MASTER WOODWORKER MFG. CO.
612 BRUSH ST., DETROIT, MICH.

Send for big description book

500 Punctures Without Loss of Air

**OVER
1,000,000
SOLD**



I'LL PAY YOU BIG MONEY
To Demonstrate My Guaranteed
MILBURN PUNCTURE-PROOF TUBES

20,000,000 CAR OWNERS

Are waiting for my amazing long-life, no trouble, air-filled, puncture-proof inner-tube—the *only* tube to successfully withstand the 500-nail-hole-plank-test without loss of air.

Costs no more than the ordinary tube and is sold under a *positive, money-back guarantee.*

MAKES MOTORING A PLEASURE—DOUBLES TIRE MILEAGE

Users of Milburn Puncture-Proof Tubes everywhere are enjoying the easy riding performance of the air-filled tube *without the annoyance of punctures and slow leaks.* And a tire mileage increase from 12,000 to 15,000 miles. Many users report 30,000 miles (double mileage) without removing a tire from the wheel.

WARNING
I am the originator of the air-filled puncture-proof tube. Beware of imitators. I have no other connection with any "so-called" puncture proof tube. —M. E. Milburn.

MONEY BACK GUARANTEE

We hereby agree to refund to any purchaser the full amount paid for any Milburn Puncture-Proof Tube that leaks air when punctured by anything not larger than a twenty-penny spike. We also guarantee that casings will last much longer and give much greater mileage where Milburn Puncture-Proof Tubes are used.

Milburn Puncture-Proof Tube Co., Inc.

PROOF

J. D. Cooper—"I have made 30,000 miles with my Milburn Puncture-Proof Tubes and have not as yet removed a rim or casing and my casings are in excellent condition."

J. T. Bardahl—"Have been using Milburn Tubes since 1922, driving every day. Have pulled out any number of nails without loss of air."

S. C. Whitely—"I have driven 200 miles in one of my Milburn Puncture-Proof Tubes without loss of air."

J. S. MacElroy—"Received the shipment of 200 Milburn Puncture-Proof Tubes and find them as represented. Hope to send you another 200 tube order soon."

W. H. Rodman—"I wish to praise your Milburn Puncture-Proof Tubes. They can't be beat. I drove 15 miles in one tube and I haven't put any air in it since. Everyone is sold over your tubes."

TEST THE MILBURN AT MY RISK

You'll be delighted. And you'll realize how easily orders are secured. Sales experience is not necessary to coin money selling the Milburn. *Positively the biggest tube value obtainable.* Absolutely non-competitive. I control all basic patents. Car owners buy on demonstration. It makes no difference what tires they use or what car they drive.

\$178.56 IN 6 DAYS

That's what A. Murphy made the first six days out with Milburn Puncture-Proof Tubes.

\$14.04 in 10 Minutes

"I made \$14.04 in ten minutes with your tubes."—Chas. Clayton.

\$58.50 in 3 Days

"The first three days out selling your tubes I cleaned up \$58.50."—J. C. Jervis.

FREE TUBE OFFER

Stop working for others! Get into business for yourself selling Milburn Puncture-Proof Tubes and you, too, can make big money. My No-Capital-Direct-From-Factory-Sales-Plan makes it easily possible. Line up your territory rights on this whirlwind seller—full or part time—NOW. National advertising campaign just starting. Big season here. Act quick. Clip and mail the FREE TUBE COUPON—NOW.

References } Industrial State Bank, Chicago.
Baker State Bank, Chicago.

M. E. Milburn, Pres.

Milburn Puncture-Proof Tube Co., Inc.
142-336 W. 47th St., Chicago, Ill.

MAIL NOW

M. E. Milburn, President
Milburn Puncture-Proof Tube Co., Inc.
142-336 W. 47th Street, Chicago, Ill. **FREE TUBE COUPON**

If the money-making opportunity is as big as you claim, I am interested in making the test so that I can enjoy a share of the profits selling Milburn Puncture-Proof Tubes. Without obligation, send me information about commission and Free Tube Offer to agents.

Name

Address

CityState.....

Your Choice \$100 DOWN

SELECT NOW!

Prompt Delivery—No Red Tape!

Send No Money—just send your name and address. We'll open a charge account, and your choice of these special bargains will come prepaid for your approval and 15 Day Trial. You pay the Postman \$1. upon arrival. If satisfied, pay the balance in 10 equal monthly payments. Otherwise return and your deposit will be refunded.

We Trust You

Your credit is good with us. Our Charge Account System is simple, easy and convenient. TRANSACTIONS CONFIDENTIAL. ORDER NOW.

Free—Complete booklet with 3,000 bargains in Diamonds, Watches and Jewelry. 10 months to pay on everything.



A75—Ladies 18K White Gold Ring: 3 AAI Quality blue-white Diamonds. Regular \$50. value. Price \$42.50

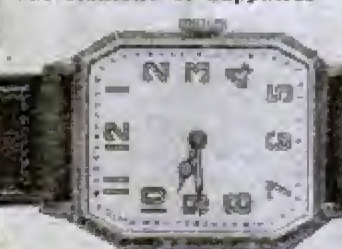


A76—Ladies 18K White Gold. AAI blue-white diamond and regular-cut diamond on each side of shank \$52.



A78—14K White Gold Wrist Watch: 4 Regular cut Blue-white Diamonds; 4 Blue Sapphires. 15 Jewel Guaranteed movement. \$42.50.

A79—The same Wrist Watch without diamond or Sapphires—\$24.95



Gents' Strap Watch—\$22.50
A80—Remarkable value in Gents' Strap Watch, high grade Gold Filled Case. Guaranteed to wear for 10 Years; dependable 15 Jewel Movement. Radium Hands and Dial. Genuine Leather Strap—price \$22.50



A81—The best watch value ever offered. 12 size, 21 Jewel, 11-lincoln Watch, Adjusted; 14K Gold Filled Case; will wear for 20 Years. Price \$45. Knife and Chain Free

AUTHORIZED CAPITAL \$1,000,000.

L.W. SWEET INC.

66L-1650-1660 BROADWAY, NEW YORK

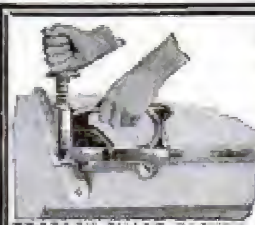
INCREASE YOUR BANK ACCOUNT



SELL ARCHER SHOES MADE-TO-ORDER SHOES

Big commissions paid daily. Permanent Repeat Business. Built-in arch support. 86% of all women should wear them. No capital or experience necessary.

Dept. E-6, THE C. W. ARCHER SHOE COMPANY, Cincinnati, Ohio



CROFOOT SHADE TACKER AND 10,000 STAPLES

WHACK and TACK!

The Crofoot Shade Tacker is the simplest and best device for fastening shades. Five times the speed of tacks and hammer. One loading 78 staples. Reloaded in three seconds. Working parts properly hardened. Non-clogging, dependable and absolutely guaranteed. Special Offer \$975 Post Paid



CROFOOT SCREEN TACKER AND 10,000 STAPLES

No screen department is complete without a Crofoot Screen Tacker. Soon pays for itself in time and labor saved. Fast as you whack is the Crofoot will Tack it. Equipped with removable hardened steel claws, DRAW WITH A CLAW AND TACK WITH A WHACK. Special Offer \$975 Post Paid



CROFOOT TAG TACKER AND 10,000 STAPLES

Thousands of shippers have found that the Crofoot Tag Tacker is everything we claim: DEPENDABLE, NON-CLOGGING. NO Needless waste of staples and that it is accurately made, easily operated and absolutely guaranteed. A shipping room without a Crofoot Tacker is like an office without a Typewriter. Special Offer \$850 Post Paid

Money back if not satisfied. Credit to rated concerns. Use Outfit 6 days and if not entirely satisfactory, return and we will refund your money. Order Today J. B. CROFOOT CO., 4000 W. North Ave., CHICAGO SOLE MANUFACTURERS

ROBERTS OIL BURNER

RESPONSIBLE DISTRIBUTORS WANTED



Solves all heating problems. Clean, economical, reliable, efficient—fits any furnace—steam, hot air or vapor. Send for large circular. Some territory open for responsible dealers.

Roberts Metallic Bathing Co., Dept. 32, 736 Meldrum Ave., Detroit, Michigan

RAISE BELGIAN HARES

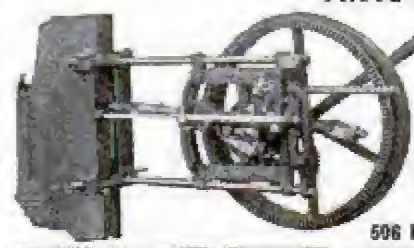
NEW ZEALAND REDS—Chinchillas—Flemish Giants
MAKE BIG MONEY—We supply stock and pay you following prices for all you raise: Belgian Hares \$2 each—New Zealand \$3 each—Chinchillas \$4 each—Flemish Giants \$6 each. 32-page illustrated book, catalog and contract, also copy of Fur Farming magazine, tells how to raise skunk, mink, fox, etc., for big profits, all for 10c. Address

OUTDOOR ENTERPRISE CO., Box 25, Holmes Park, Mo.

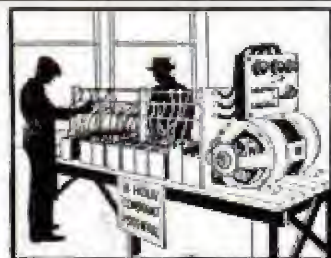
Make \$300 to \$800 Monthly Selling the Champion Mortiser

One of the most remarkable machines ever invented for contractors, carpenters, builders, cabinet makers, furniture repair men, wood-working shops, ship building plants, etc. Makes a perfect mortise any length to 6", any depth to 4", and any width to 1 1/2"—and will do this in any kind of wood, cross-grained, knotty, thru-dowel pins, or toughest timber.

Sales Agents Wanted



Reliable men wanted in every county to sell this remarkable machine. Must furnish references. Exclusive territory and liberal commission to right man. Big building boom throughout country offers wonderful market for this machine. Excellent chance for hustlers to make big money. Full particulars on request. Send today. COLGAN MACHINERY & SUPPLY CO. 506 Hayden Bldg., Columbus, O.



ONE DAY BATTERY CHARGING PAYS BIG PROFITS \$150 to \$300 MONTHLY

Add One Day Battery Charging profits to your income. It's easy to build your own big business, clearing \$150 to \$300 profit every month. Every auto or radio owner wants One Day Charging Service. Only \$35 cash brings you complete HB One Day Charging outfit. Balance easy terms, quickly paid in a few months by your increased profits. 30 days free trial in your shop on moneyback guarantee. Start now—write today for free bulletin. HOBART BROS. CO. Box M5 TROY, OHIO

MAKE YOURS THE BUSY SHOP WITH HB ONE DAY BATTERY CHARGING



60 MILES ON A GALLON OF GASOLINE

TESTS SHOW FORD CAN RUN 60 MILES ON A GALLON

The amazing fact that a Ford can run 60 miles on 1 gallon of gasoline was recently brought to light through tests conducted by America's foremost engineers, where it was shown that a gallon of gasoline contains sufficient heat units which if properly atomized and mixed with air would give this additional mileage. Great strides have already been made in this direction by the recent invention of a simple attachment which can be installed in a few minutes without any alterations to the motor. It is common for Ford Owners to make from 40 to 44 miles per gallon after this marvelous device is attached.

MOST WONDERFUL INVENTION TODAY BRINGS JOY TO FORD OWNERS

Starts Ford Instantly

Starting a Ford Car in cold or zero weather is something every Ford Owner dreads—everybody realizes that difficult starting is an abuse on the starter and battery. Thousands of Ford Cars are "laid up" during the Winter just for these reasons. This great difficulty has been overcome. "The SUPER positively starts a Ford Car instantly in the coldest weather."

Marvelous Device

The SUPER is no trick affair—requires no mechanical adjustments and contains all the scientific principles of carburetors costing \$20 to \$35 and in its natural action uses up every particle of unused gasoline and breaks it up into a perfect vapor. The hitherto impossible is now realized by the SUPER.

Everybody Satisfied

Saves 3 to 7 Dollars Per Month

The best investment I ever made. The SUPER is saving me from three to seven dollars each month, besides putting new life into my motor.

A. H. WORRA, Iowa.

Makes 44 Miles Per Gallon

I have tried the SUPER and the results of the experiment are satisfactory. One quart of gasoline run my Ford 11 miles over improved roads which is just about again as far as I could run with the plain Ford Carburetor.

G. E. YODER, Penn.

Finds That Our Claims Are Correct

I find that your claims for increased mileage are correct and that a big saving is made by your SUPER, in fact, the best device I have met with in that line.

M. J. VAN LEEUWEN, Mass.



The
Heart
of the
Motor

Eliminates Oil Pumping in Front Cylinder

What a wonderful relief to Mr. Ford Owner when he realizes that he can run his car without the motor pumping oil in the front cylinder. Sounds like an awful lot to expect of any device, but that is what the SUPER does and this is only one of its many advantages because it puts real efficiency into any Ford Car.

Complete Combustion

The SUPER is so designed that it takes advantage of the present Ford Carburetor and properly atomizes the light as well as the heavy elements of the fuel, converting every atom of gasoline and kerosene into power preventing liquid fuel from passing into the cylinders, thus avoiding carbon formation and oil dilution.

Easy to Sell

Sells Like Hot Cakes

This is a recent letter from one of our distributors: "Enclosed find draft for 200 more SUPERS, rush as I need them badly. I sold them banked \$104.00 in one day. Hope to sell 1000 SUPERS next month."

A. W. LEONARD, Penn.

Making Big Profits Every Noon

I have been working the SUPER at noon only. Yesterday noon I made more money with the SUPER than I did at my 11 hours' hard work in the factory all day.

J. L. LEHNER, Wis.

Had No Previous Selling Experience

This letter shows what ambition does: "I sold six SUPERS in less than 2 hours tonight. I think it's a pretty good start—for it's the first thing I ever sold."

E. MANGOLD, Ind.

\$60.00 TO \$150.00 PER WEEK EASY

You just can't help making Big Money selling the SUPER because a trial sells itself and soon everyone in the neighborhood get talking about this marvelous device. Men like Leonard, Shaw, Manner, Kinsley, Peters, Sands, Beck and Hall are not exceptional salesmen, but just the type of men that saw an opportunity and were quick to grasp it when within reach. No previous selling experience is necessary, just a little ambition on your part to make money is all we ask and we will extend the same opportunity to you. Spare time will pay you well. If you can devote your entire time so much the better, because the SUPER is a whirl-wind seller and takes hold in a locality like wildfire.

Men Wanted Everywhere To Introduce

We want distributors in all parts of the country to take orders and deliver the SUPER and to look after the repeat business that is bound to follow and to such distributors we are willing to assign territory. You do not have to own a Ford to take up this proposition but if you have a Ford it is easier to explain its many advantages. However a Trial of the SUPER convinces the most doubtful person and tells a wonderful story.

A REAL FUTURE HERE

WEEKS SUPER CARBURETOR CO.

424-1635 Eleventh St., Milwaukee, Wis.

MAIL TODAY
WEEKS SUPER CARBURETOR CO.
424-1635 Eleventh Street, Milwaukee, Wis.
GENTLEMEN: Please mail me full free particulars about your wonderful invention.

Name.....
St. or R.F.D.....
Town.....
County.....
State.....

Be Your Own Boss

Why keep on punching the time clock? Aren't you tired of taking orders from someone else? There's nothing like being in business for yourself!

Here's your big opportunity. Grasp it. Realize your ambition. Have a profitable business of your own. Be the Johnson Floor Expert in your community. Spring, the big business season, is just ahead. Now is the time to get started. We'll help you build your business.



**Earn
\$15 to \$25
a Day**

Be independent! Have a home of your own—a bank account. Enjoy the comforts and luxuries of life.

As the Johnson Floor Expert you can make big money right from the start. There's a bigger demand for this service every day. Homes, clubs, hotels, stores, offices, schools and public buildings all want it.

You can go into any home, wax-polish all the floor in just a short time and not upset the rooms at all. It's the kind of service people appreciate—and it pays big profits.

Mail Coupon today for full information on the Johnson Floor Service Plan.

JOHNSON'S WAX *Electric floor Polisher*

This ingenious Electric Floor Polisher means success, independence, a profitable business of your own. It's extremely efficient. Wax-polishes any floor ten times faster and better than is possible any other way. Polishes right under

davenport, beds, buffets and desks. Johnson's Electric Floor Polisher is simple, sturdy, light, easy to handle. Runs itself from any lamp socket. Costs less than 2 cents an hour to operate. Cuts floor and linoleum maintenance costs in half.

Investment Less Than \$50

Have you ever seen such an opportunity? Think of it! A profitable business of your own for less than \$50! No more lay-offs. No dull seasons. Start giving orders instead of taking them. Have a business that will be as big as you want to make it. Get started now. Don't delay. Return coupon today.

MAIL ME BACK TO

S. C. JOHNSON & SON

Dept. P. A. 6, RACINE, WIS.

"The Floor Finishing Authorities"

Please tell me how I can earn \$15 to \$25 a day giving Johnson Floor Service.

NAME

ADDRESS

CITY & STATE

Cord Tire FREE and \$300 a month



Here's your tire—the world's finest. Hand made—over-size, semi-balloon type, fits any wheel or rim, uses 40% less air pressure—gives balloon comfort and efficiency. Big thick tread. As near skid proof, rut proof, wear proof as it is possible to get. **NEW JOY IN RIDING** rough roads. Now any man who owns a car can get a free tire and *make big money* for a little time in showing and recommending Mellinger Cord Tires. Make your car an asset, not an expense. *With the Mellinger Plan you don't risk a cent.* The biggest opportunity you ever heard of. Let me send you an amazing *free book*, "A Billion Dollar Business," that tells of the Mellinger Plan and how you can easily *make \$300 a month and get your own tires Free.*



Declares War on Rubber Trust

Car owners everywhere are protesting against high cost of tires. Four advances in prices in the last few months. Rubber, British controlled monopoly, jumped from 12 cents to over a dollar a pound. **HERE IS YOUR OPPORTUNITY** for Mellinger is stopping this raid on American Pocket Books. Mellinger products bought before advances, **MELLINGER ONE-STEP DISTRIBUTION PLAN** saving big costs; I am passing on these advantages and delivering the *finest mileage guaranteed tires* at a saving of approximately \$6.00 to \$25.95 per tire.

GUARANTEED
15,000
MILES

FURTHERMORE, to secure demonstrators and boosters I am going to give away a number of these *15,000 mile De Luxe Cord Tires*. I want you to show this tire on your own car. I will ship these tires absolutely prepaid. Be the first from your neighborhood to get my confidential advertising offer and **HELP MY BIG FIGHT FOR BETTER AND LESS EXPENSIVE TIRES** for the American car owner.

FREE

Book tells how
you can get
free Cord Tires
for your own
use.

Earn Big Money

I want to send you my Free Book, "A Billion Dollar Business." This book has been a real treasure chest for thousands of men. Explains the remarkable **Mellinger Plan**. Tells how to buy tires at wholesale. Tells how to make money. Full of pictures. Full of interesting stories of men earning \$300 to \$500 a month. Tells how to get into business for yourself with profits guaranteed, and without risking one cent. **Tells how to get Free Cord tires for your own use.**

I also want to send my Free Sample Kit and ship you a Cord Tire prepaid on approval. Simply send name. Mail coupon or post card will do, but **BE THE FIRST FROM YOUR LOCALITY** to receive my amazing offer.

Master Salesman Kit FREE

and in 5 minutes you demonstrate tire secrets the average dealer knows nothing about. All in well bound portfolio with good size samples of fabric, cord, rubber, cross sections cut from tires and pure gum tubes.



Write or send coupon to the address nearest to you—either Kansas City, Mo., Philadelphia, Pa., or Oakland, Calif.

**10,000
Mellinger
Agents**

are now distributing these marvelous tires. If I have no agent in your locality I will make you an amazing offer. This company, now in its *8th Successful Year*, started with \$5000 capital, now has \$600,000 and supplies **OVER A MILLION DOLLARS WORTH OF TIRES ANNUALLY** through local agents—the biggest business of its kind in the world.

Mail the coupon today or write nearest office

B. L. MELLINGER, President

MELLINGER TIRE & RUBBER CO.

Dept. 2598, Kansas City, Mo.
Dept. 2598, Philadelphia, Pa.
Dept. 2598, Oakland, Calif.

Capital \$600,000
References: Any Bank or Trust Co.,
or any Publication

MAIL COUPON TODAY

Mr. B. L. Mellinger, Pres.
Dept. 2598, Kansas City, Mo.
Dept. 2598, Philadelphia, Pa.
Dept. 2598, Oakland, Calif.

**Mail to
Nearest
Office**

Send me Free Book, Wholesale Prices and how, without investing money. I can become your authorized agent and get a free tire for my own use.

Name _____

Address _____

Town _____ State _____



**MELLINGER BALLOON CORD
GUARANTEED 15,000 MILES**

8th Successful Year

"Not at all - the aroma
is delightful"



Chesterfield

CIGARETTES